Ditch Witch®

M Series

ISSUE NO. 7–7/88

This replacement manual includes Models:
M, M2, M3 Series, M4, M422 and M Crawler

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FOREWORD

Ditch Witch equipment is designed and manufactured to give years of dependable service. This manual helps ensure that by giving you an illustrated Parts List from which to select quality Ditch Witch replacement parts.

When ordering, use part numbers and descriptions (not reference numbers), and refer to the model and serial number of your equipment.

Read all footnotes carefully. Part numbers shown in reverse type (white on black) are not available from The Charles Machine Works, Inc. However, information concerning fabrication or alternate suppliers may be obtained by contacting our Technical Services department. If parts are listed N.A. they are to be replaced by redesigned parts as shown, or no further information is available.

Ordinary vendor items should not be substituted as replacement parts because of variances in grades of materials. Repair or replacement parts should be ordered from your authorized Ditch Witch dealer.

Instructions on safely using and maintaining this equipment appear in the Operator's Manual for your Ditch Witch machine. If you have questions not answered in these publications, your dealer representative will be glad to assist you.

The descriptions and specifications in this manual are subject to change. The Charles Machine Works, Inc., reserves the right to modify equipment at any time as part of normal product improvement.

Thank you for your patronage and confidence in Ditch Witch equipment.

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SAFETY

This section outlines basic safety procedures that apply to the operation, maintenance and adjustment of M Series trenchers.

The M trencher is a self-propelled, handlebar trencher designed to dig in a variety of soil conditions and move large volumes of dirt in a short time. It is a powerful, productive machine. Operate and maintain it with respect and caution. Misuse or carelessness can result in serious injury or equipment damage. Safety precautions must be observed at all times.

⚠This safety alert symbol identifies important safety messages throughout this manual and on the machine. When you see this symbol, carefully read the message that follows and become alert. Your safety is at stake.

OPERATOR QUALIFICATIONS

Inexperience is hazardous in operating any machine or attachment. Trial and error is not the way to become familiar with a piece of equipment. This is expensive, cuts equipment life and causes much time lost for repairs. Inexperience can cause injury or even death.

Before operating this equipment, an individual should read this manual. Then, he should be shown how to operate the M trencher by an experienced operator.

GENERAL SAFETY

Before starting machine, become familiar with controls and their functions. Once this is done, the function of each control may be checked while engine is running at idle.

The machine should be started and operated strictly in accordance with Operation section instructions.

Be sure you know what is below ground (location of electric, gas or telephone lines, etc.) before operating.

Use extra caution when maneuvering in a crowded area. Always clear area before moving. The operator should know machine's clearances before moving into a crowded area.

When backing M trencher toward an object, stand beside machine within reach of Master Clutch. Becoming caught between handlebars and an object can result in serious injury.

Adjustments to teeth, chains or guards and lubrication, fueling, etc., should be done with engine shut down.

If an object becomes lodged in digging chain, place Master Clutch in disengaged position and stop engine before attempting to release object.

When making trench observations, never stand over chain area unless engine is shut down.

If trencher is to be left unattended, stop engine, lower boom to ground, block wheels and disengage Master and Belt Clutches. Remove key from electric start models.

Avoid contact with hot exhaust system. Allow engine to cool before checking or servicing.

Use caution when trenching or mobiling on slopes. Whenever possible, trench downhill.

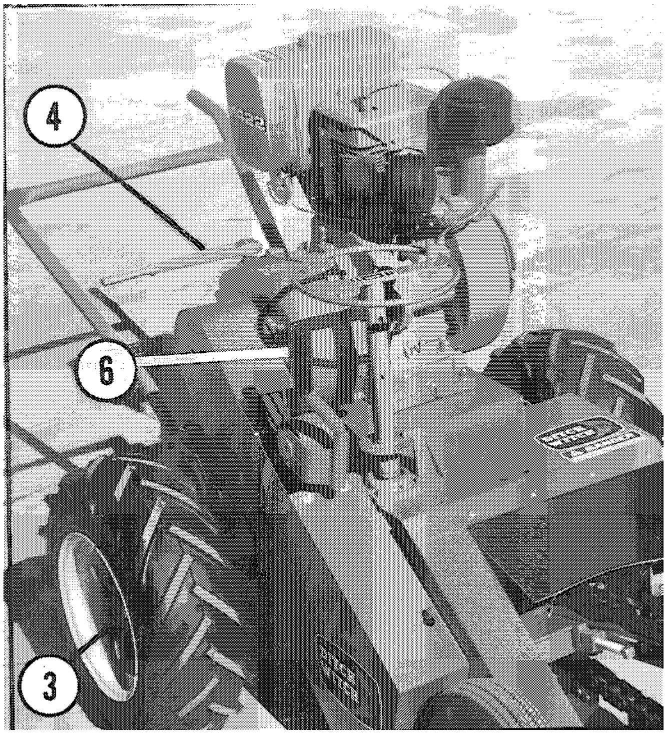
Keep sparks and open flames away from battery on electric start trencher to reduce hazard of fire and explosion. Avoid contacting battery with metal objects which may cause dangerous sparking.

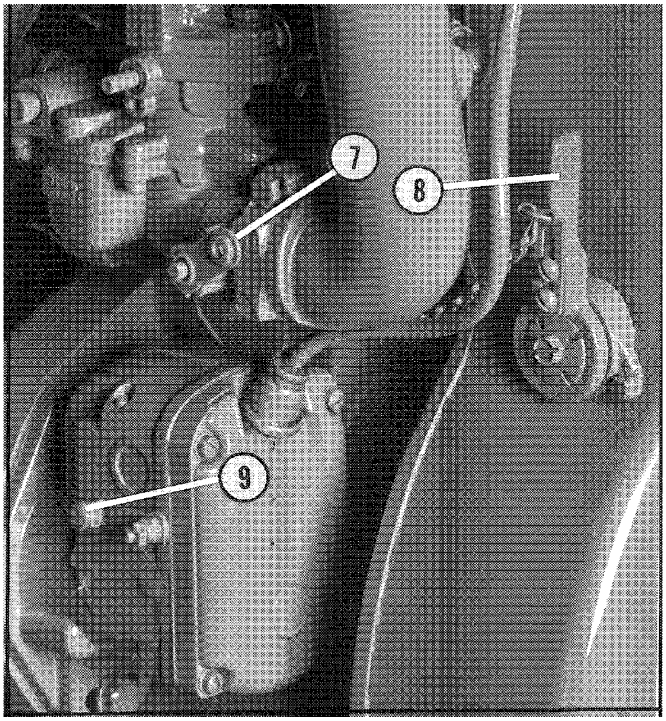
Never add fuel when engine is operating. Do not smoke when adding fuel or servicing fuel system.

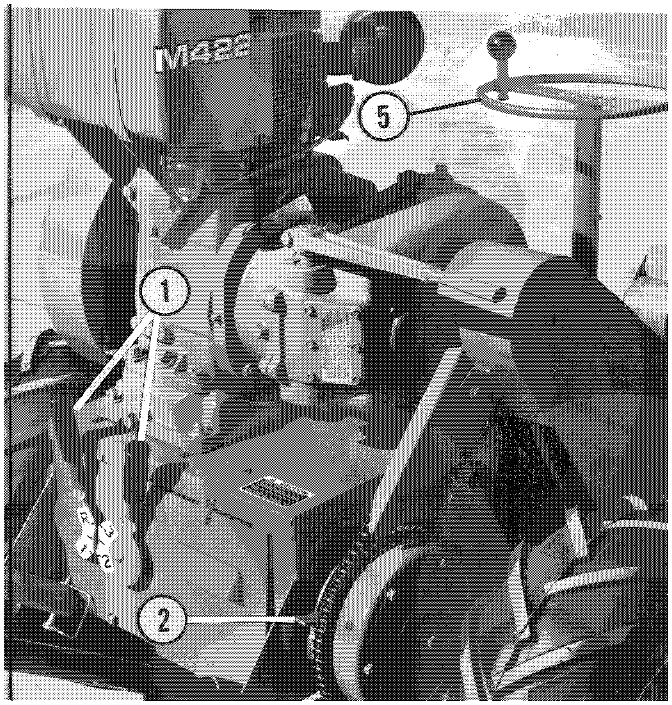
If trouble is encountered or anticipated, stop engine and make systematic check to locate problem.

Keep all bystanders clear of digging chain and spoils auger.

CONTROLS







IDENTIFICATION OF CONTROLS

1. Transmission Shift Levers
2. Reducer Shift Lever
3. Wheel Clutch
4. Master Clutch
5. Boom Depth Control
6. Belt Clutch
7. Choke
8. Throttle
9. Engine Stop Button

NOT SHOWN:

10. Ammeter
11. Push-Button Starter
12. ON/OFF Switch
13. Steering Lever

TRANSMISSION SHIFT LEVERS

Two short levers on frame between handlebars are used to shift transmission to one of three forward speeds or reverse. Do not force Transmission Shift Levers; they are designed so one lever must be in neutral for other to be placed in gear.

REDUCER SHIFT LEVER

Reducer Shift Lever is used to gear machine for either MOBILE or DIG operation. By slipping Master Clutch to turn reducer until lever is near handlebars, operator may pull lever up for DIG mode and push it down for MOBILE mode.

WHEEL CLUTCH

Wheel Clutch is a screw hub which provides power and traction to right drive wheel when clutch is turned clockwise. Turning Wheel Clutch counterclockwise removes traction from right drive wheel and makes maneuvering over smooth ground easier.

MASTER CLUTCH

Push Master Clutch handle away from handlebars to apply power to both drive and dig components. To stop both digging chain and drive wheels, pull Master Clutch handle toward handlebars.

BOOM DEPTH CONTROL

Boom Depth Control is used to raise and lower digging boom by turning hand wheel. Depress Depth Control to disengage lock at base and turn hand wheel clockwise to lower boom. When downward pressure is relieved, boom may be locked in position by aligning lock tab with notch in control base.

BELT CLUTCH

Belt Clutch controls power to digging chain and has over-center lock-out and lock-in positions. Digging chain is started by pulling Belt Clutch handle toward handlebars, which pushes roller into belts. To stop power to digging chain, push clutch away from handlebars, which lifts roller off belts.

CHOKE, THROTTLE & ENGINE STOP BUTTON

Engine is controlled with Choke, Throttle and Engine Stop Button. Choke is used to start a cold engine by pulling down on choke lever. Throttle is used to control engine speed. Engine Stop Button is pressed to ground engine spark and kill engine.

AMMETER, PUSH-BUTTON START & ON/OFF SWITCH

On electric start models, Ammeter measures amount of charge going to or from battery. When engine is operating, Ammeter should read zero or higher. Push Button Start is used to start engine when ON/OFF Switch key is in ON position. ON/OFF Switch is used to kill engine by turning to OFF.

STEERING LEVER

On crawler machines, Steering Lever controls direction by selectively applying power to either track. To turn left, push Steering Lever left, which releases left track clutch and allows right track to drive machine left.

OPERATION

STARTUP

⚠CAUTION: Powerful equipment. Read and understand instructions in Operator's Manual before attempting to operate. Improper operation can result in crippling injury or death.

⚠CAUTION: Moving chain. Make sure digging chain is disengaged before engaging clutch. Otherwise, chain will rotate and may cause serious injury.

Disengage Master Clutch by pulling lever toward handlebars.

Place transmission in neutral (both levers up).

Close Choke and open Throttle 1/3.

Use ON/OFF Switch and Push-Button Starter, recoil starter or rope wound clockwise on starter sheave and pulled quickly until engine starts.

When engine warms up, open Choke and close Throttle. Engine should run at low idle.

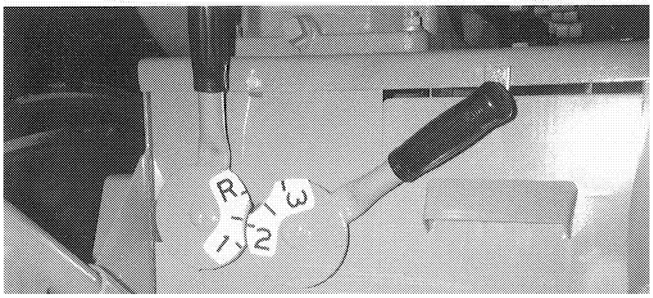
MOBILE OPERATION

Disengage Belt Clutch by pushing handle away from handlebars.

Slip Master Clutch until Reducer Shift Lever rotates to convenient position. Disengage Master Clutch and move Reducer Shift Lever to MOBILE mode. Push and pull on handlebars to rock machine until reducer lock engages.

Disengage Wheel Clutch (rubber tired machines) by turning Wheel Clutch counterclockwise.

NOTE: This allows one drive wheel to "free wheel" so machine may be steered easily. On rough or uneven ground, leave Wheel Clutch engaged and slide wheels to steer.



Shift transmission to 2nd gear by placing left Transmission Shift Lever in neutral (handle up) and turning right handle to right.

NOTE: If shifting is difficult, rock rubber tired machine to front and rear while shifting to align gear teeth. With crawler, disengage both track clutches by moving steering lever to one side, then the other.

Open Throttle 1/4. Slowly engage Master Clutch to move machine forward.

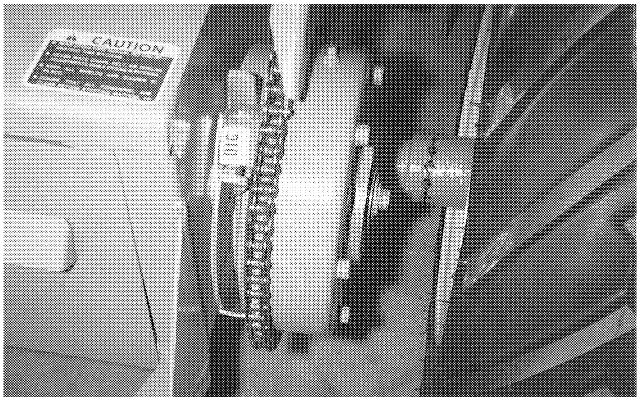
To steer rubber tired machine, bear down on handlebars and pivot machine to desired direction. To steer crawler machine, move Steering Lever to left or right.

To stop machine, disengage Master Clutch, close Throttle and push Engine Stop Button or turn ON/OFF Switch to OFF.

DIG OPERATION

⚠DANGER: Danger zone. Keep all personnel at least 6 ft (2 m) away from machine and digging boom's maximum reach while operating. Being struck by moving machine, digging boom or debris can cause serious injury or death.

Mobile machine to desired location, disengage Master Clutch and engage Wheel Clutch by turning clockwise.



Move Reducer Shift Lever to DIG mode. Rock machine to front and rear to ensure reducer is fully engaged in DIG. A loud click will sound when reducer locks in DIG mode.

Depress Boom Depth Control and turn wheel counterclockwise until chain teeth are approximately one inch from ground.

Place transmission in 1st gear and engage Belt Clutch.

Open Throttle 1/2 and engage Master Clutch.

Slowly turn Boom Depth Control Wheel clockwise until machine digs to desired depth.

NOTE: If engine lugs, hold Depth Control Wheel in same position or raise boom slightly until engine rpm increases.

Lock Boom Depth Control by aligning notch with locking lug and relieving downward pressure.

Disengage Master Clutch, shift transmission to 3rd gear and open Throttle completely.

NOTE: In normal soil, machine should trench satisfactorily in 3rd gear at full throttle. In difficult digging conditions, or when digging trench of maximum capabilities, using a lower gear may be necessary. If machine lugs or stalls frequently, or if excessive ground slippage causes machine to drift sideways, try a lower gear.

To shift transmission while digging, disengage Master Clutch and reduce Throttle to half open. Rock rubber tired machine or disengage both track clutches on crawler. Move Transmission Shift Levers to desired gear, engage Master Clutch and increase Throttle to full open position.

When trench is finished, disengage Master Clutch and reduce engine speed to 1/4. Raise boom. Disengage Belt Clutch and shift reducer to MOBILE mode. Shift transmission into desired gear and mobile away from trench.

TRANSPORTING

Load and unload M Series trencher on level ground and only onto trailer properly attached to tow vehicle. With adequate loading ramps, a half-ton truck can carry the lightest M trencher, but a trailer is recommended since commonly used models exceed 1,000 pounds.

⚠CAUTION: Heavy load. Read trailer Operator's Manual before loading or transporting machine. Incorrectly loaded equipment can slip or cause trailer sway which may result in serious injury.

To load M trencher onto trailer, mobile to a point in line with ramps or tilt bed. Disengage Master Clutch, shift reducer to DIG mode, and shift transmission to reverse so machine will approach trailer boom first. Make sure digging boom is raised and Belt Clutch is disengaged. Securely chain machine to trailer using load binders.

UNLOADING

Remove chains and binders, disengage Master Clutch and start engine. With reducer still in DIG mode, shift transmission to low gear and slowly move off trailer. When clear of trailer ramps or bed, change to MOBILE mode and move to jobsite.

OPERATION TIPS

Trenching with badly worn digging teeth is false economy. It causes costly wear to equipment and reduces production greatly. Digging teeth are wear items and should be considered a cost of trench production. Keep your digging chain filled with Ditch Witch teeth in good condition.

A shear key attaches planetary reducer unit to transmission shaft. This key is 5/16 inch square brass, 3/4 inch long (5/16 x 1-1/2 inch on MCR) and is four times as strong as normally is needed. If sheared, do not replace with steel key. This shear key protects transmission. If it shears frequently, check chain tension between transmission and drive axle. Three extra shear keys are provided with each machine. Reorder these as they are used.

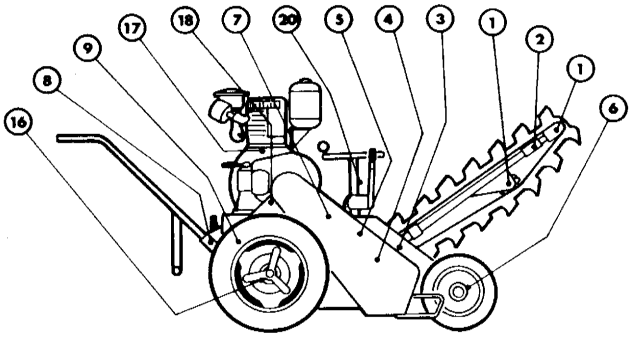
It is not advisable to dig shallow trench with long boom. Digging efficiency is best when digging chain is operating at 45° to 60° below horizontal. For maximum trenching speed and performance, never dig wider than needed.

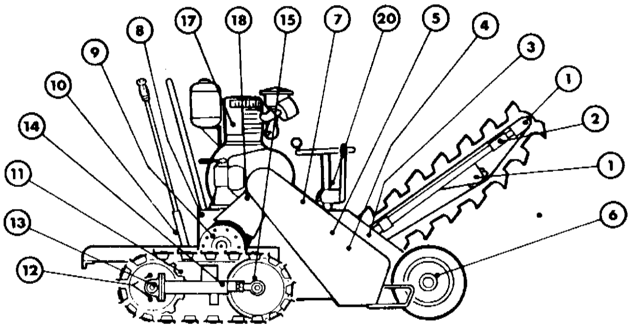
When cutting across asphalt roads, start trench in soil at road edge and dig with shortest possible boom.

Continual slippage or spinning of wheels does not increase trenching speed; it only wears out tires. Operate in gear appropriate for digging conditions.

When trenching on a slope, stake a 4 x 4 inch wood beam parallel to intended course and just far enough from trencher to guide down-slope wheel.

LUBRICATION





CAUTION: Moving parts. Shut down engine before performing service or maintenance. Contact with moving engine or attachment parts can cause serious injury.

INTERVAL HOURS	REF. NO.	IDENTIFICATION	SERVICE	LUBRICANT	NO. OF POINTS
AT EACH REFUELING	1.	BOOM IDLER SPROCKET	LUBE	MPG	0 *(2)
	2.	BOOM IDLER SPRING HOUSING	LUBE	MPG	0 *(1)
	10.	STEERING LEVER	LUBE	MPG	1
	11.	STEERING CLUTCH YOKE	LUBE	MPG	2
	12.	STEERING CLUTCH THROW OUT BEARING	LUBE	MPG	4
	13.	DRIVE AXLE	LUBE	MPG	2
	14.	TRACK TENSION	LUBE	MPG	2
	15.	TRACK IDLER WHEEL	LUBE	MPG	2
4–HOUR SERVICE	3.	BOOM PIVOT	LUBE	MPG	1
	4.	HEAD SHAFT BEARING	LUBE	MPG	1
	5.	DEPTH CONTROL PIVOT	LUBE	MPG	1
8–HOUR SERVICE	6.	TRAIL WHEEL BEARING	LUBE	MPG	1 +(2)
	7.	BELT CLUTCH PIVOT	LUBE	MPG	1
	16.	WHEEL CLUTCH	LUBE	MPG	1
	17.	ENGINE OIL	CHECK	GEO	1
	18.	ENGINE REDUCER OIL	CHECK	EO	1
50–HOUR SERVICE	20.	DEPTH CONTROL WHEEL	LUBE	MPG	1
	17.	ENGINE OIL	CHANGE	GEO	1

INTERVAL HOURS	REF. NO.	IDENTIFICATION	SERVICE	LUBRICANT	NO. OF POINTS
300–HOUR SERVICE	18.	ENGINE REDUCER OIL	CHANGE	EO	1
SERVICE AS NEEDED	8.	TRANSMISSION	†LUBE	MPG	1
	9.	PLANETARY REDUCER	†LUBE	EPG	1

*Early models
+Optional dual wheels
†Maximum of one or two shots of grease daily

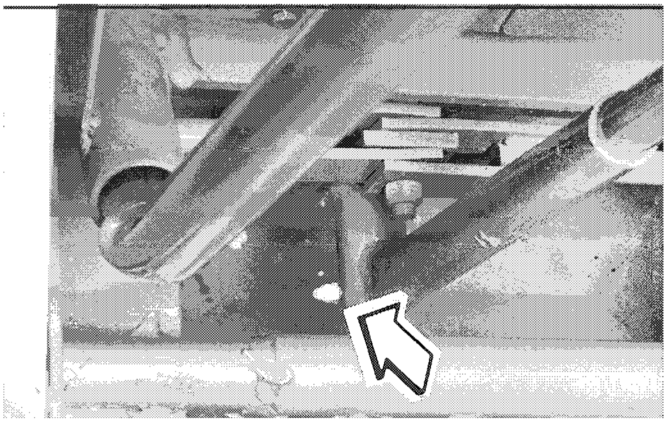
LUBRICANT DEFINITIONS:

MPG	Multipurpose grease
[1]GEO	Gasoline engine oil meeting API service classification SD
[1]EO	Engine oil, not for engine application
EPG	Extreme pressure grease

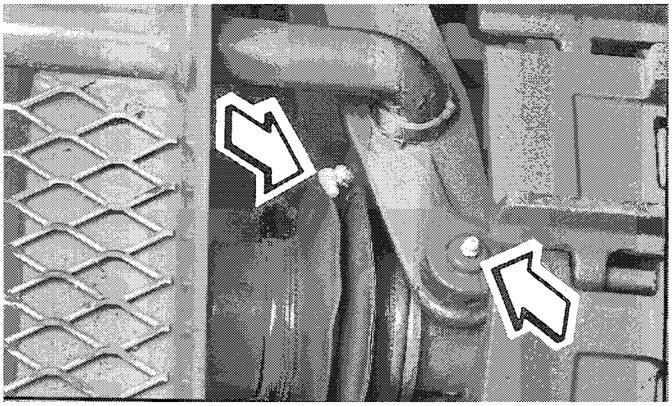
[1] See recommended GEO and EO temperature/weight chart at end of Lubrication section

AT EACH REFUELING

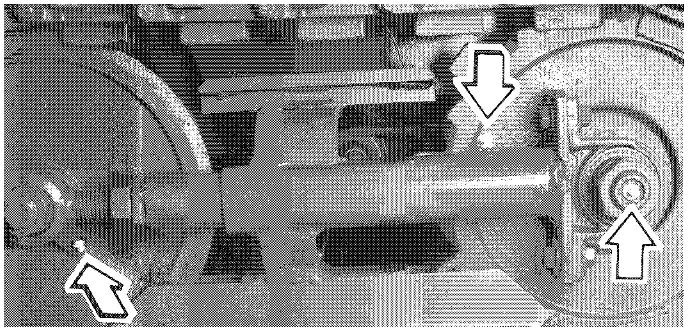
On older machines, boom idler sprocket bearing and idler spring housing should be greased at each refueling. Newer machines have sealed, lifetime bearings and urethane boom sleeve which require no lubrication.



Crawler machines have grease zerk at base of Steering Lever.

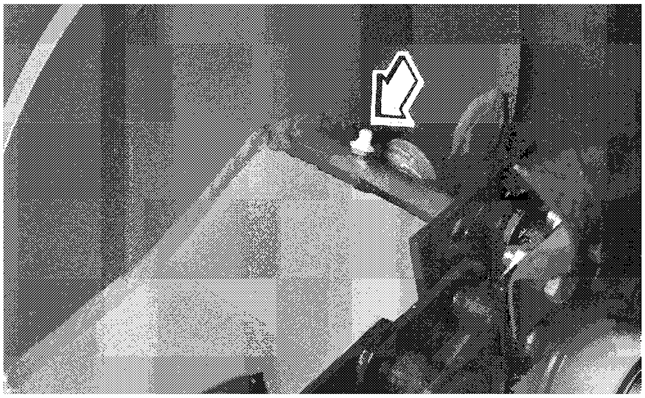


Each clutch yoke on crawler machine has grease fitting on interior side and two throw out bearing fittings.

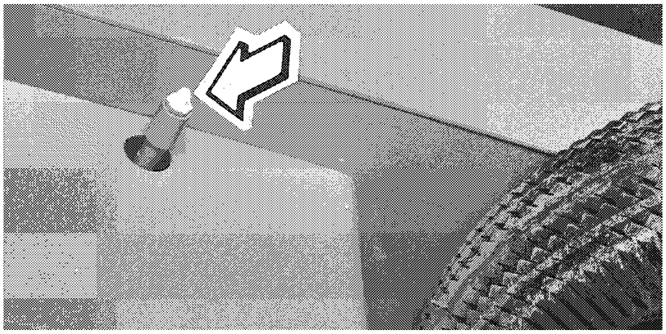


On either side of crawler machine, fittings on drive axle, track tension assembly and track idler wheel should be greased at each refueling.

FOUR-HOUR SERVICE



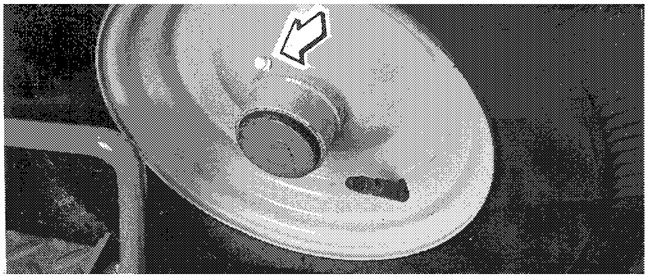
The grease fitting on boom pivot is a four-hour lubrication point. On older machines, fitting is on boom side of pivot. Newer machines, fitting is on opposite side.



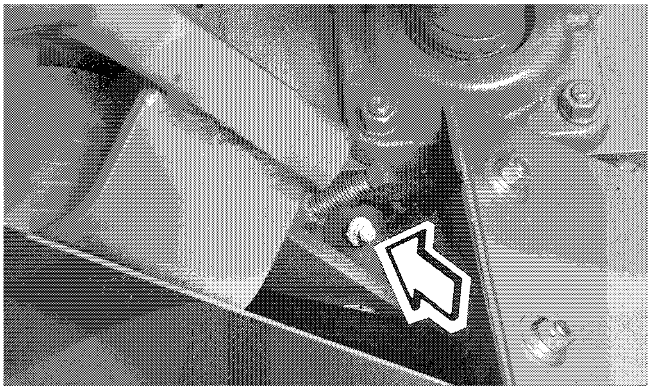
Protruding through top of belt guard is fitting for greasing digging chain head shaft bearing.

Depth Control pivot has fitting at its base.

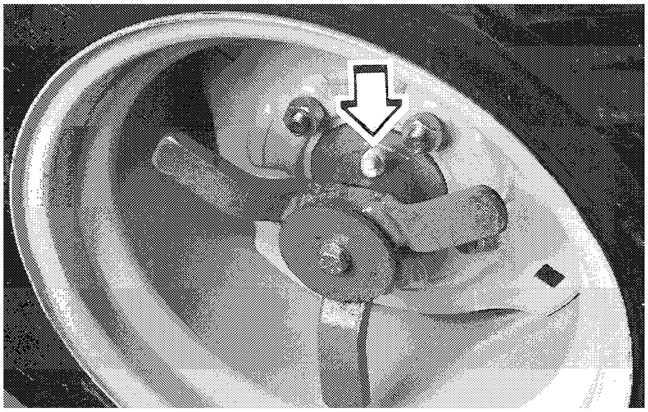
EIGHT-HOUR SERVICE



Trail wheel has grease fitting for easy bearing lubrication.



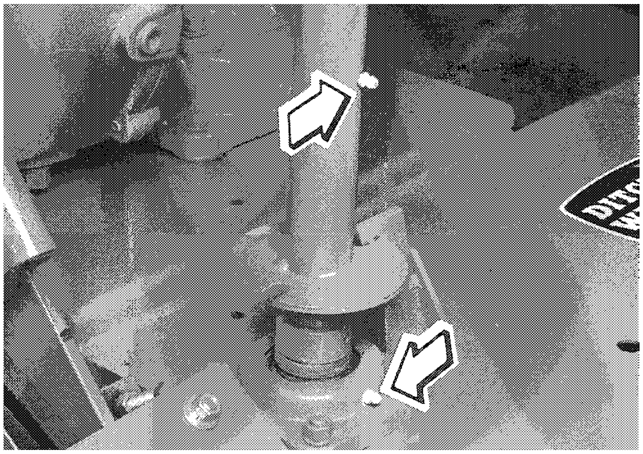
Belt Clutch pivot should be greased each eight hours.



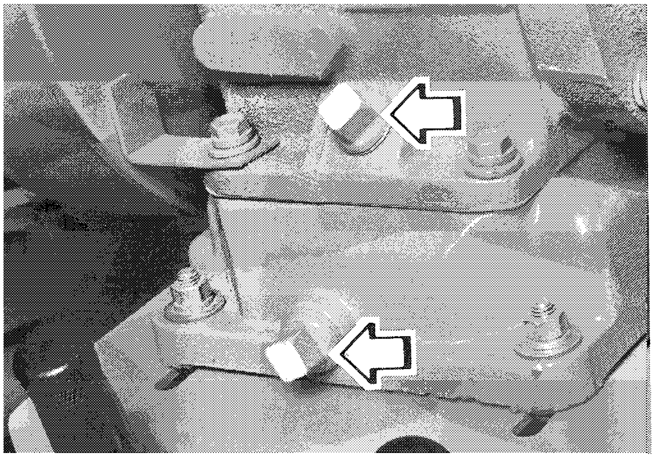
Grease Wheel Clutch each eight hours.

Check engine and reducer oil levels each eight hours.

50-HOUR SERVICE

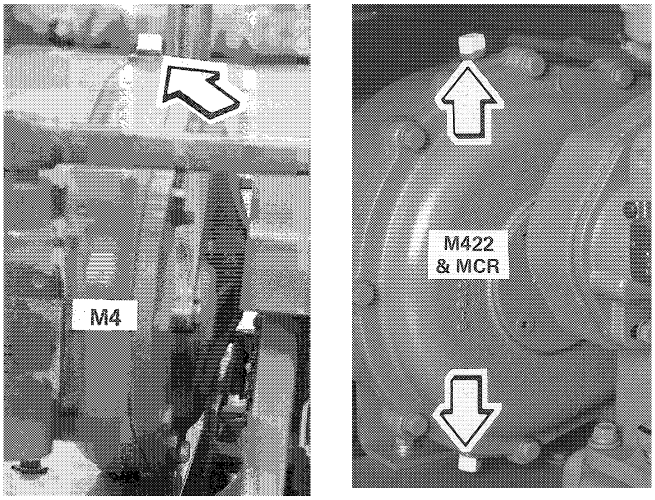


Boom Depth Control shaft fitting needs grease each 50 hours.



Change engine oil each 50 hours. M4 machines require 1.5 qt. (1.4 L) GEO, and M422 machines take 3.5 qt (3.3 L) GEO. Fill and drain plugs are located at front or rear of engine.

300-HOUR SERVICE

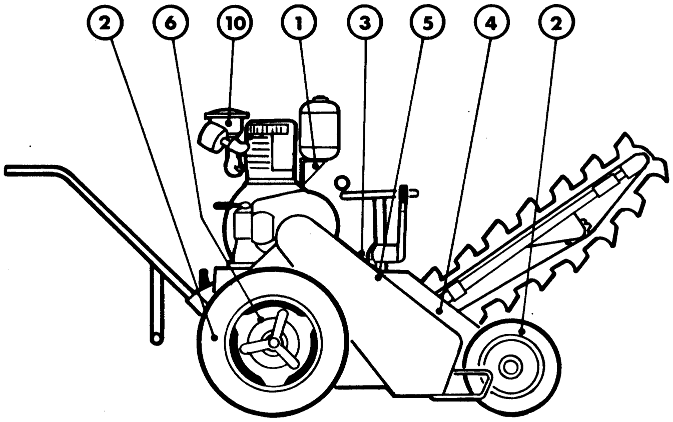


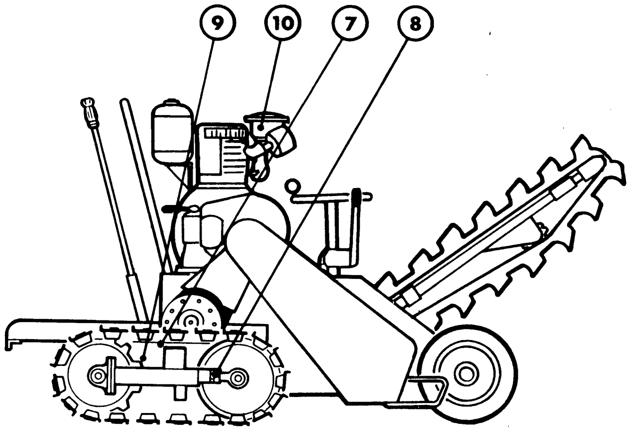
Change engine reducer oil each 300 hours. M4 machines require 0.5 qt (0.5 L) EO, and M422 machines take 0.75 qt (0.7 L). Fill plug is on reducer top and drain plug is on bottom. On M4, bottom bolt of reducer side cover must be removed and oil allowed to drain.

OIL TEMPERATURE/WEIGHT CHART

SAE Weight	*Temperature*
30W	above 40° (above +4°C)
20–20W	15 to 40° (–9 to +4°C)
10W	0 to 15°F (–18 to –9°C)
5W–20	below zero (below –18°C)

MAINTENANCE

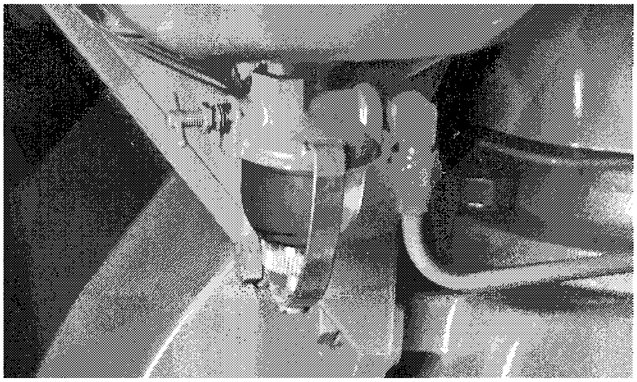




⚠CAUTION: Moving parts. Shut down engine before performing service or maintenance. Contact with moving engine or attachment parts can cause serious injury.

INTERVAL HOURS	REF. NO.	IDENTIFICATION	SERVICE
AT EACH REFUELING	1.	FUEL SEDIMENT BOWL	CHECK
8–HOUR SERVICE	2.	TIRES	CHECK
150–HOUR SERVICE	3.	BATTERY	CHECK
AS NEEDED	4.	DIGGING CHAIN TENSION	ADJUST
	5.	DRIVE BELT TENSION	ADJUST
	6.	DRIVE CHAIN	ADJUST
	7.	STEERING RODS	ADJUST
	8.	TRACK TENSION	ADJUST
	9.	BRAKES	ADJUST
	10.	AIR FILTER	CHECK

AT EACH REFUELING

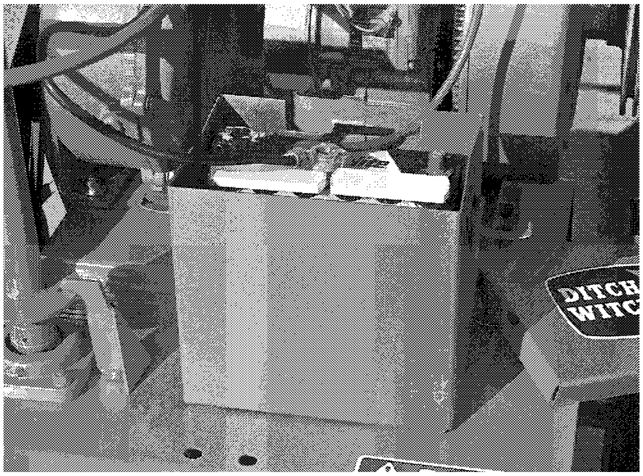


The fuel sediment bowl should be checked for dirt or water daily. To clean, close fuel shutoff valve, loosen holding screw and remove bowl, clean, replace, open shutoff valve and check for fuel leaks.

8-HOUR SERVICE

Check tires with accurate pressure gauge each day before operating machine. Recommended pressure for 4.80 x 4.00 x 8, two-ply trail wheel tires is 20 pounds per square inch. The 23 x 8.50 x 12, two-ply drive wheel tires take 10 psi. Optional 23 x 6.00 x 12, two-ply drive wheel tires should have 14 psi.

150-HOUR SERVICE



Electric start models have battery box mounted on frame. To service battery, remove box lid and disconnect ground cable.

⚠CAUTION: Contains acid. Sulfuric acid can cause severe burns. Avoid contact with skin or eyes. If splashed onto skin or into eyes, immediately flush with water.

⚠CAUTION: Explosive gas. Disconnect ground cable before servicing or removing battery. Explosion or fire can result from spark produced by contact between any part of machine and positive terminal if ground is connected.

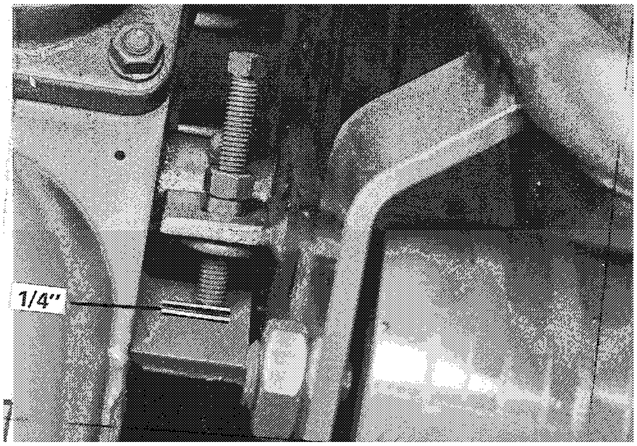
Check battery each 150 hours of operation. Add distilled water as needed to keep electrolyte level above plates, but do not overfill. Keep battery and terminals clean and free of corrosion.

SERVICE AS NEEDED

DIGGING CHAIN TENSION

To adjust digging chain, turn adjusting screws at base of boom. Tension is correct when slide and stop will move in and out one inch as lower section of digging chain is pushed down. At this adjustment, chain will just clear top of boom, and slide and stop play will allow gravel, sticks and other objects to pass through sprocket without jamming.

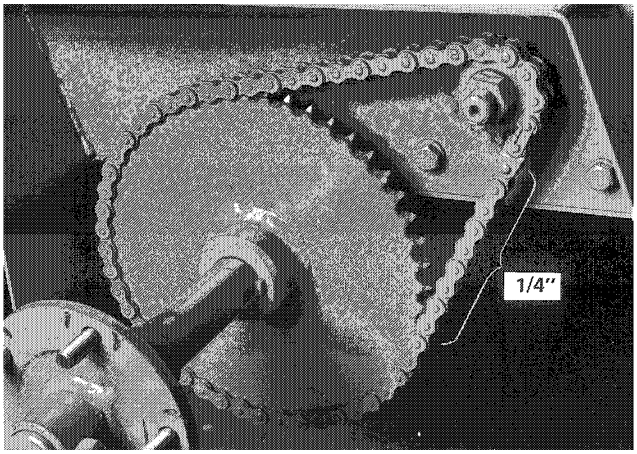
BELT TENSION



To adjust digging chain drive belts, turn screw on

Belt Clutch pivot. Correct adjustment is 1/4 inch gap between Belt Clutch stop and belt stop screw with Master Clutch engaged. Loosening adjusting screw allows belts to run tighter under load.

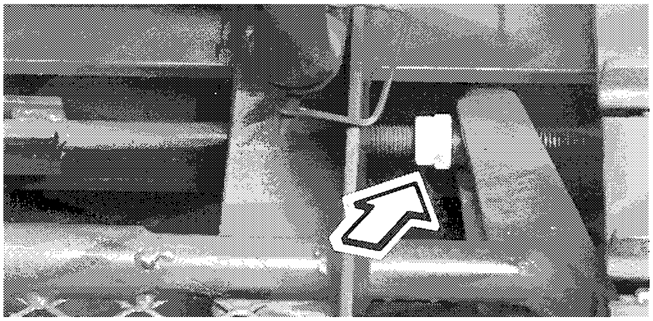
DRIVE CHAIN



On rubber tired machines, drive chain is adjusted by loosening four bolts holding engine to frame and two bolts on reducer bracket, then shifting engine away from handlebars. Retighten all hold-down bolts. At correct adjustment, axle drive chain has 1/4 inch deflection.

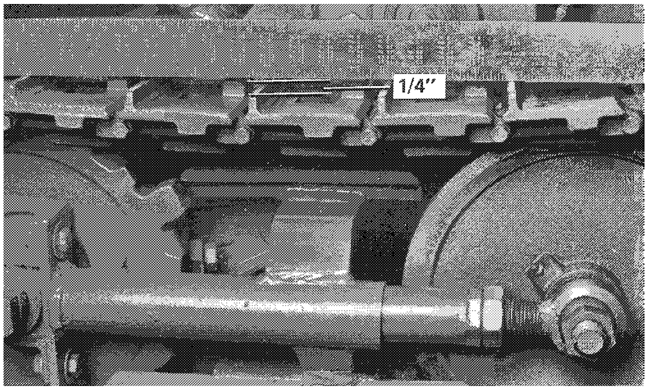
The track drive chain on crawler machine may be adjusted by loosening frame stop adjusting screw at front of trencher frame and five bolts which hold trencher frame to track frame. Slide trencher frame toward axle to loosen chain and toward frame stop adjusting screw to tighten chain. Correct tension is 1/4 inch deflection in track drive chain.

STEERING RODS



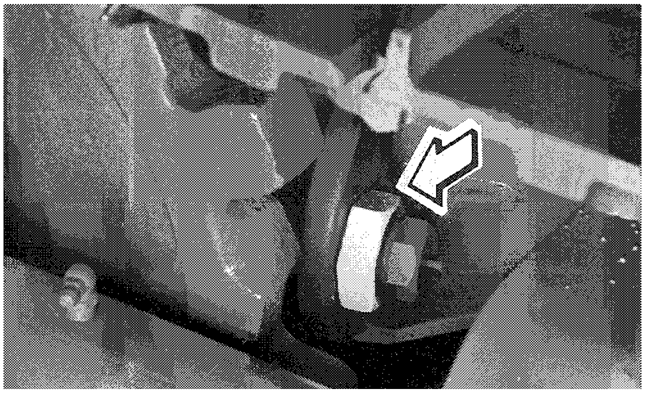
The Steering Lever should move only slightly before affecting clutch yoke. Any excess movement may be corrected by running out jam nuts on steering rods.

TRACK TENSION



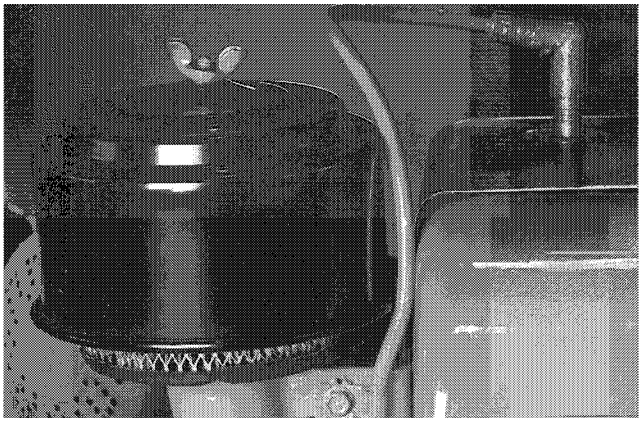
Crawler track tension is adjusted by loosening jam nut on track tension assembly and turning assembly support tube. To adjust, run trencher forward until idler wheel is directly atop one track pad. Place straightedge on pads over sprocket and idler wheel. Turn tube until track sag below straightedge is 1/4 inch.

BRAKES



Crawler brakes should be adjusted so clutch yokes completely disengage before braking begins. To do this, disengage clutch yoke on one side by moving Steering Lever to that side. Rock machine forward until yoke remains disengaged when lever is released. (Edges of clutch yoke and brake drum normally are flush in this position.) Tighten brake adjusting bolt until brake shoe fully contacts brake drum, but is not tight against drum. Repeat on other side.

AIR FILTER

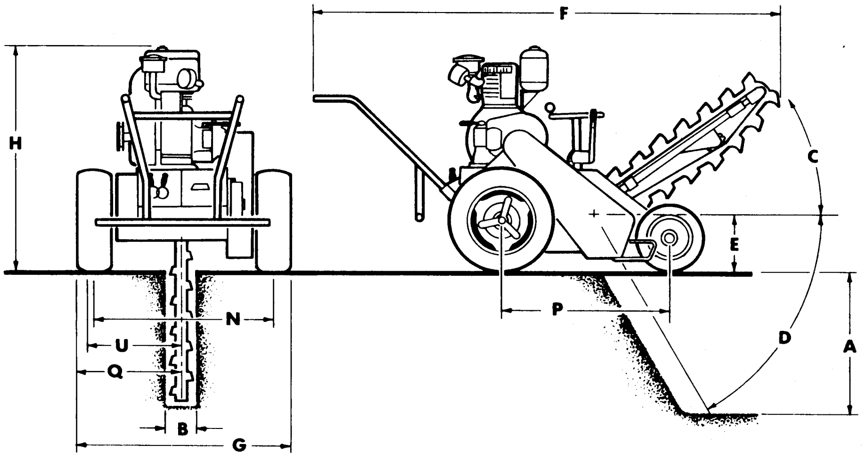


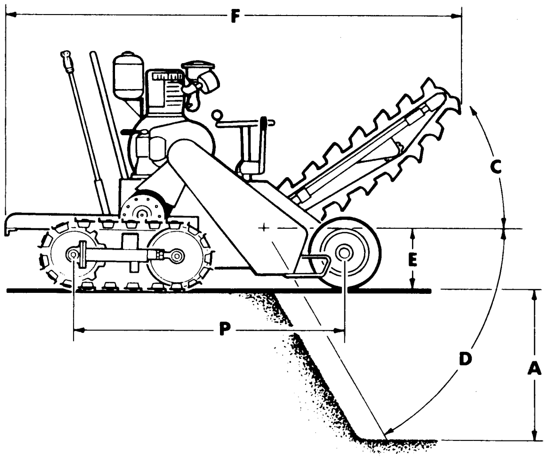
Dry element air filter should be cleaned after each 50 hours of operation by tapping lightly to dislodge dirt, or by washing with water and mild soap solution. Do not wash with solvents. Change as required. Oil bath air filter should be checked each eight hours and oil changed each 50 hours.

SHEAR KEY

To replace reducer-to-transmission shear key, remove right wheel or track. Remove drive chain and bolt in center of reducer and shift assembly. Pull reducer and shift assembly off transmission shaft. Replace 5/16 inch square x 3/4 inch long brass key (5/16 x 1-1/2 inch in MCR). Reinstall reducer, bolt, chain and wheel or track.

SPECIFICATIONS





DIMENSIONAL:	U.S.	METRIC
A. Maximum Trench Depth	60 in	1524 mm
B. Trench Width (Min. to Max.)	3-1/4–16 in	82–406 mm
C. Boom Travel (Up)	40°	40°
D. Boom Travel (Down)	70°	70°
E. Head Shaft Height–Digging Chain	11 in	279 mm
F. Length (Mobiling)–M4 and M422	113 in	2870 mm
M422CR	97 in	2464 mm
G. Width (Mobiling)	46-1/2 in	1181 mm
H. Height (Mobiling)–M4	46 in	1168 mm
M422 and M422CR	50 in	1270 mm
N. Tread	38-1/2 in	978 mm
P. Wheelbase	36 in	914 mm
Q. Centerline Trench to Outside Edge of Trencher	23 in	584 mm
U. Spoil Discharge Reach	22 in	559 mm

GENERAL: Self-propelled, rigid frame, chain type trencher. Travel speeds for mobile and dig range are provided by a mechanical transmission with three forward and one reverse. Trencher is powered by an air-cooled gasoline engine that is connected to a gear reduction unit by a matched set of shock reducing belts. The M4 and M422 are two-wheel drive, non-riding, rubber tire mounted models. Model M422CR is a track mounted unit with riding platform.

OPERATIONAL:		**U.S.**	**METRIC**
Max. Vehicle Speeds...			
Mobile (forward)—	M4 standard	2.6 mph	4.2 kph
	M4 high speed	4.4 mph	7.1 kph
	M422 standard	3.4 mph	5.5 kph
	M422 high speed	5.6 mph	9.0 kph
	M422CR standard	2.6 mph	4.2 kph
	M422CR high speed	N.A.	N.A.
Mobile (reverse)—	M4 standard	0.7 mph	1.1 kph
	M4 high speed	1.8 mph	2.9 kph
	M422 standard	2.0 mph	3.2 kph
	M422 high speed	1.7 mph	2.7 kph
	M422CR standard	0.8 mph	1.3 kph
	M422CR high speed	N.A.	N.A.
Crowd—	M4 standard	6.1 fpm	1.86 mpm
	M4 high speed	9.9 fpm	3.02 mpm
	M422 standard	7.8 fpm	2.38 mpm
	M422 high speed	12.6 fpm	3.84 mpm
	M422CR standard	5.9 fpm	1.8 mpm
	M422CR high speed	N.A.	N.A.
Digging Chain Speed...			
Rated @ 2800 RPM — .	M4	301 fpm	92 mpm
	M422	320 fpm	98 mpm
	M422CR	320 fpm	98 mpm

Trencher Model Maximum Depth	DEPTH		WIDTH	
	U.S.	METRIC	U.S.	METRIC
M422 & MCR only	24"	610 mm	16"	406 mm
M422 & MCR only	30"	762 mm	12"	305 mm
M422 & MCR only	36"	914 mm	10"	254 mm
M4 Maximum Depth = 36" @ 8" wide	42"	1067 mm	8"	203 mm
M4 Maximum Depth = 42" @ 6" wide	48"	1219 mm	6"	1152 mm
M4 Maximum Depth = 48" @ 4" wide	60"	1524 mm	4"	102 mm
	60"	1524 mm	3-1/4"	82 mm

Spoils Handling...

Auger—Type .... Single, Open End

—Size .... U.S. — 16 in O.D. x 4 in I.D. x 16 in lg x 18 in P

METRIC — 406 mm O.D. x 102 mm I.D. x 406 mm lg x 457 mm P

—Speed (M4) .... 238 RPM .... 238 RPM

Crumber—Type .... Mechanical

—Size .... 4—16 in .... 102—406 mm

OPERATIONAL (Cont'd.):

Operating Weights (Weight based on shortest boom and narrow width digging chain)...

	U.S.	METRIC
M4	838 lb	380 kg
M422	948 lb	430 kg
M422CR	1498 lb	679 kg

POWER PLANT:

Model M4...

	U.S.	METRIC
Engine	Teledyne Wisconsin AENLD	
Cooling Medium	Air	
Number of Cylinders	One	
Displacement	23 in^3	376.9 cm^3
Bore	3 in	76 mm
Stroke	3.25 in	83 mm
Full load, flywheel horsepower @ 2650 RPM	8.1 hp	6.0 kW
Fuel consumption @ 2800 RPM	1.38 gph	5.2 Lph
*Maximum Tilt Angle	25°	25°

M422 and M422CR...

	U.S.	METRIC
Engine	Teledyne AGND	
Cooling Medium	Air	
Number of Cylinders	One	
Displacement	38.5 in^3	632 cm^3
Bore	3.51 in	89 mm
Stroke	4.0 in	102 mm
Full load, flywheel horsepower @ 2650 RPM	11.9 hp	8.9 kW
Fuel consumption @ 2800 RPM	.66 gph	2.5 Lph
*Maximum Tilt Angle	25°	25°

***Exceeding these operating angles will cause engine damage. This DOES NOT IMPLY machine is stable to maximum angle of safe engine operation.**

POWER TRAIN:

Ground Drive...

Transmission—Mobile	Mechanical three speed forward with one reverse with chain drive to axles.	
—Crowd	(Same as Mobile)	
Clutch	Mechanical, hand operated, disc type.	
Tires	Standard 23—8.50 x 12 Optional 23—6.00 x 12	

Trencher Drive...

Transmission	Gear reduction with belt to head shaft.	
Clutch	Spring loaded, with tension roller for belt drive.	
Belts	Matched set of three.	
Digging Chain	20,000 lb test	9072 kg test
Chain Drive Sprocket	Forged, machined and tempered	
Digging Teeth	Bolt on cup teeth with hard surfaced edge of tungsten carbide.	

Spoils Handling Drive...

Type	Mechanical — Attached to and rotates with head shaft

FLUID CAPACITIES:	U.S.	METRIC
Fuel Tank...		
M44	1.7 gal	6.4 L
M422 and M422CR	2.75 gal	10.4 L
Engine Oil...		
M4	1.5 qt	1.4 L
M422 and M422CR	3.5 qt	3.3 L
Engine Reducer...		
M4	0.5 qt	0.47 L
M422 and M422CR	.75 qt	0.7 L
Planetary Reducer Grease	1 lb	0.5 kg

Specifications are called out according to SAE recommended practices. Specifications are general and subject to change without notice. If exact measurements are required, equipment should be weighed and measured. Due to selected options, delivered equipment may not necessarily match that shown.

PARTS LIST

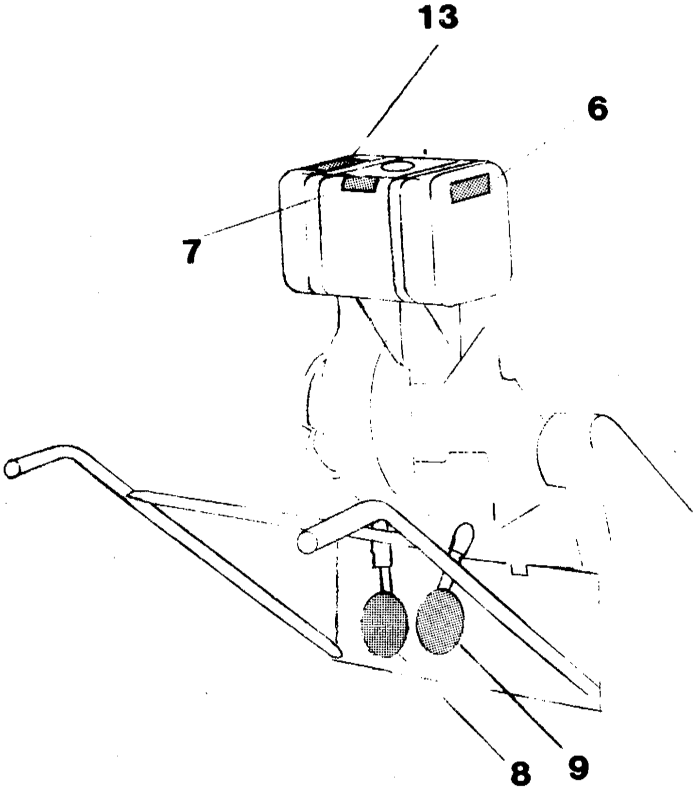
This Illustrated Parts Listing provides a quick and easy-to-use reference for ordering genuine Ditch Witch parts. When ordering, use part numbers and descriptions (not reference numbers), and refer to the model and serial number of your equipment.

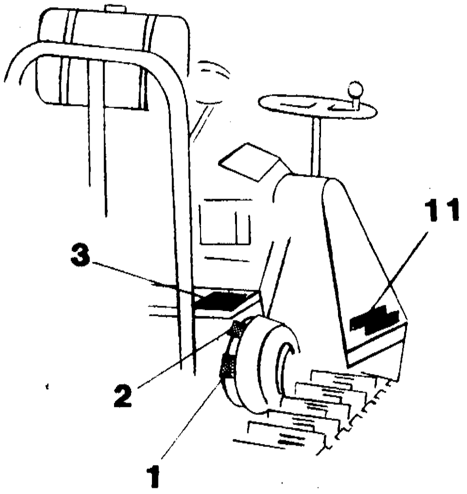
Read all footnotes carefully. Part numbers shown in reverse type (white on black) are not available from The Charles Machine Works, Inc. However, information concerning fabrication or alternate suppliers may be obtained by contacting our Technical Services department. If parts are listed N.A., they are to be replaced by redesigned parts as shown, or no further information is available.

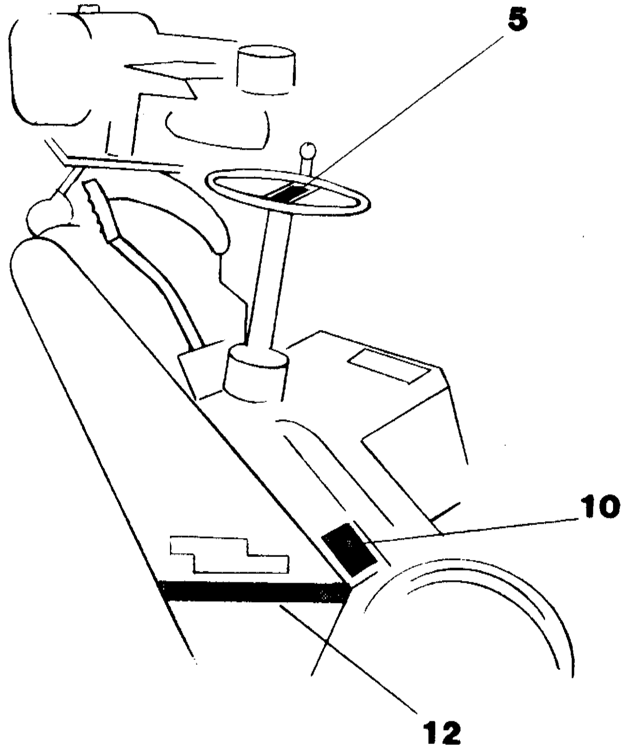
Ordinary vendor items should not be substituted as replacement parts because of variances in grades of materials. Repair or replacement parts should be ordered from your authorized Ditch Witch dealer.

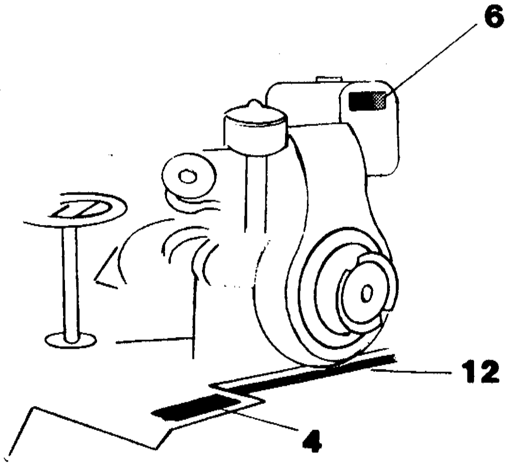
Almost every part order is an emergency to some degree. A few minutes spent verifying part identification will save you many hours of unprofitable down time.

The Charles Machine Works, Inc., is involved in an ongoing program of research, development and refinement of its products. Changes from original models may be noticed if you request a replacement copy of this manual. Such changes are the normal activity of the manufacturer and do not place The Charles Machine Works, Inc., or its dealers under any obligation to update or modify equipment previously sold. If such modifications are made, they shall be with normal parts and labor charges unless otherwise waived, in writing, by the manufacturer.









275—503 DECAL KIT

FOR MODELS M4, M422 AND M422CR

Ref. No.	Part Number	Qty.	Description
	050-303		Location Diagram
1.	275-034	1	Mobile
2.	275-035	1	Dig
3.	275-048	1	Important Safety Rules
4.	275-097	1	Danger Chain & Auger
5.	275-098	1	Boom
6.	275-105	2	M4 Model-ID
	275-106	2	M422 Model-ID
	275-109	2	MCR Model-ID
7.	275-173	1	Fuel Tank (Gasoline)

Ref. No.	Part Number	Qty.	Description
8.	275-247	1	Transmission (R-1)—Chevy
	275-039	1	[1]Transmission (R-1)—Ford
9.	275-248	1	Tranmission (3-2)—Chevy
	275-040	1	[1]Tranmission (3-2)—Ford
10.	275-306	1	Ditch Witch® Emblem
11.	275-311	1	Ditch Witch®-ID
12.	275-312	2	Accent Stripe (1" x 21")
13.	275-419	1	Warning Flammable

[1] Not part of kit. This decal is required on model below S/N 125469 and S/N 125926 thru S/N 127342.

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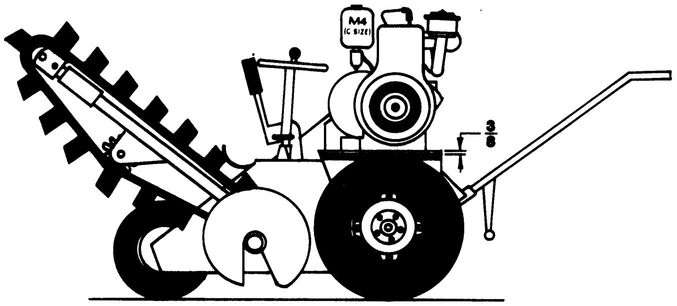
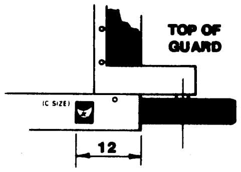
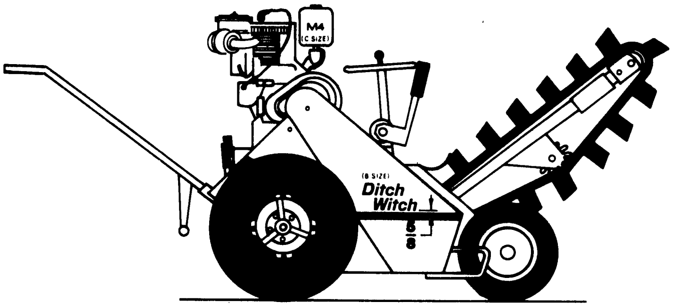
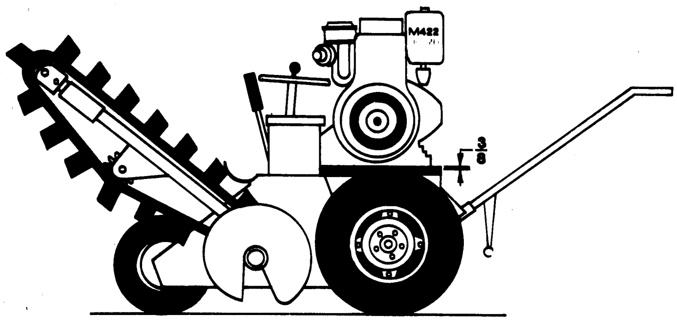


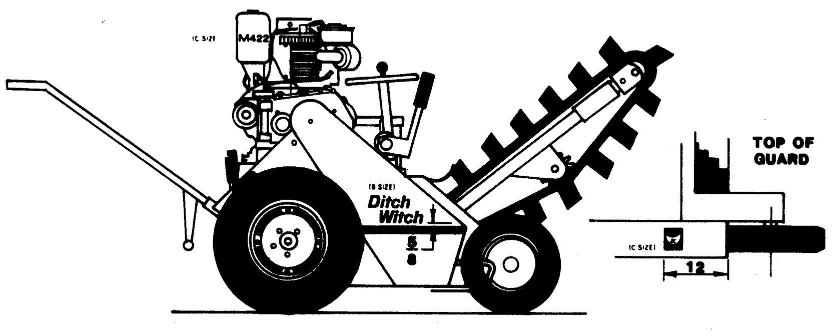
M4







M422



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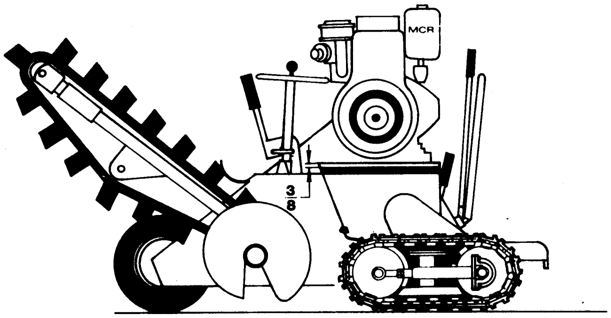
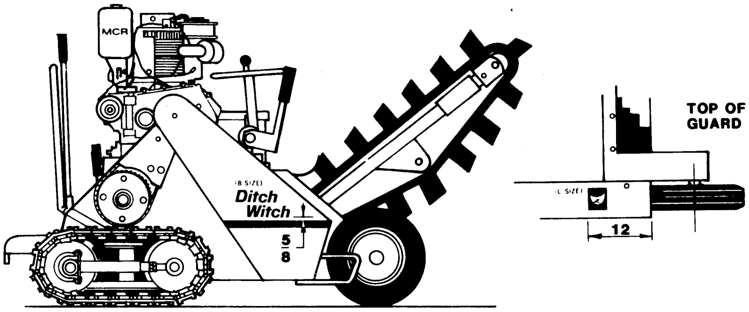
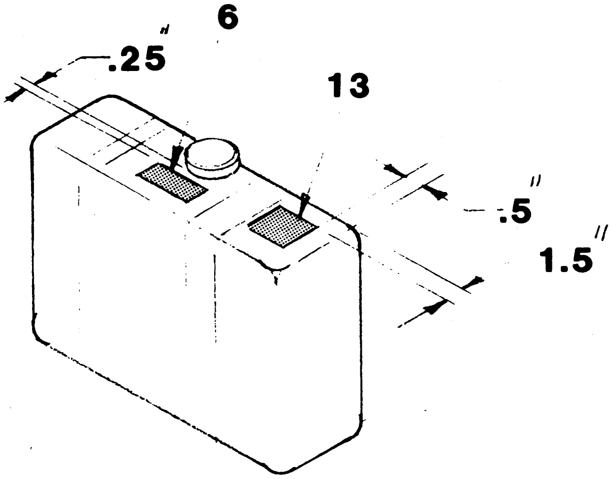
MCR

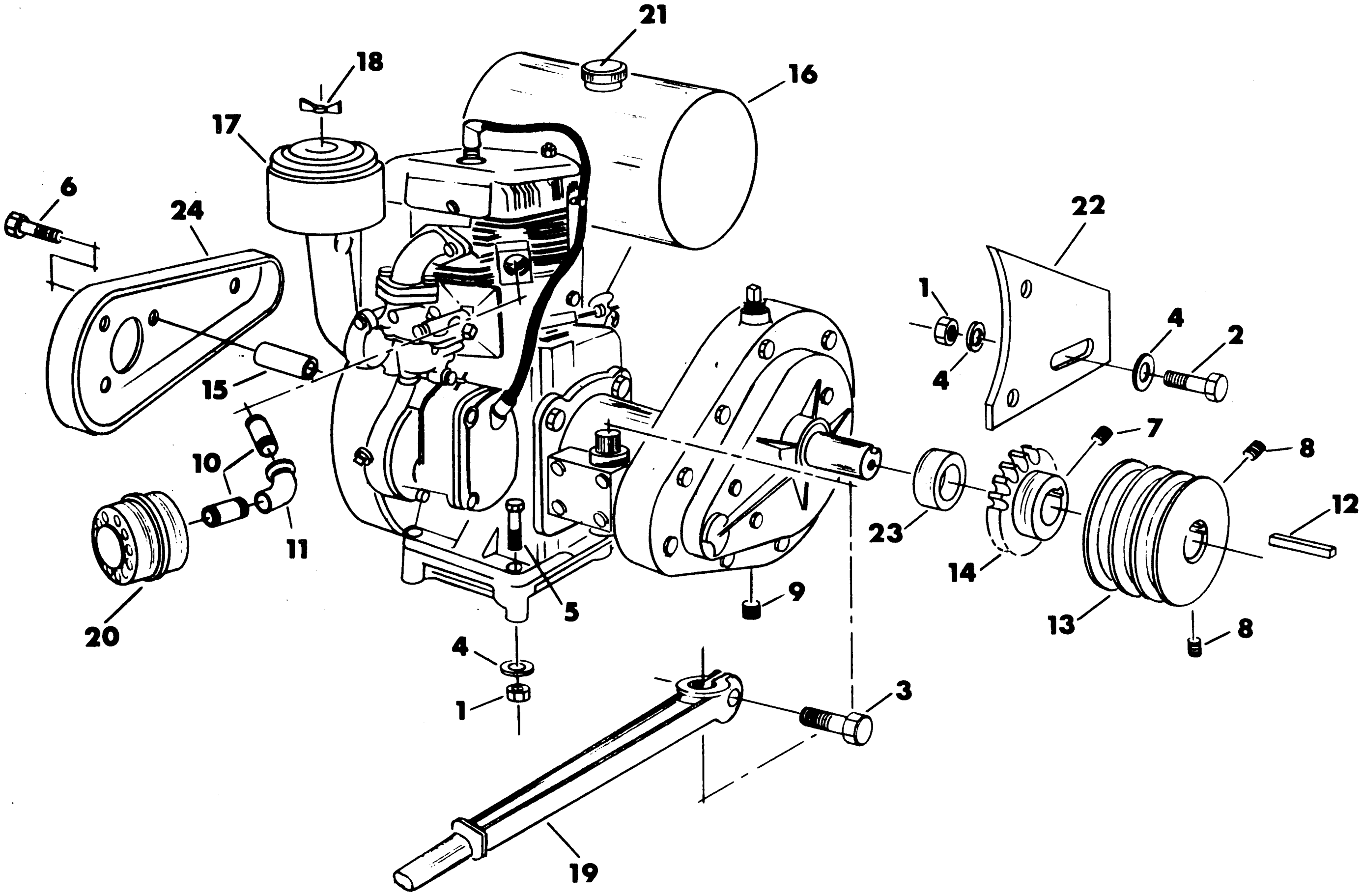

MCR
3/8


MCR
(B SIZE)
Ditch Witch
5/8
TOP OF GUARD
(C SIZE)
12


6
.25"
13
.5"
1.5"

WISCONSIN ENGINE

AENLD—9 HP



Ref. No.	Part Number	Qty.	Description
	195-101		Rope Start Engine (Incl. ref. no.'s 16 thru 21)
	195-105		Electric Start Engine (Incl. ref. no.'s 16 thru 21)
1.	105-089	5	Locknut (5/16-NC)
2.	105-094	1	Bolt (5/16-NC x 1")
3.	105-109	1	Bolt (5/16-NC x 1-1/2")
4.	105-117	6	Washer (5/16")
5.	105-190	4	Bolt (5/16-NC x 2-3/4")
6.	105-191	3	Bolt (1/4-NC x 2-1/4", RD SLT HD)—M4E
7.	105-704	1	Setscrew (5/16-NC x 1/4")
	105-701	1	Setscrew (5/16-NC x 3/8")—replacements
8.	105-705	2	Setscrew (1/4-NC x 3/8")
9.	115-178	1	Pipe Plug (3/8-NPT, SQ FM HD)
10.	115-206	2	Pipe Nipple (1-NPT x 2-1/2" LG)
11.	115-208	1	Pipe Elbow (1-NPT)
12.	165-923	1	Key (1/4" SQ x 2" LG)
13.	170-104	1	Sheave
14.	175-019	1	Sprocket
15.	180-200	3	Guard Spacer (M4E)
16.	195-111	1	Fuel Tank (RD)—Incl. ref. no. 21

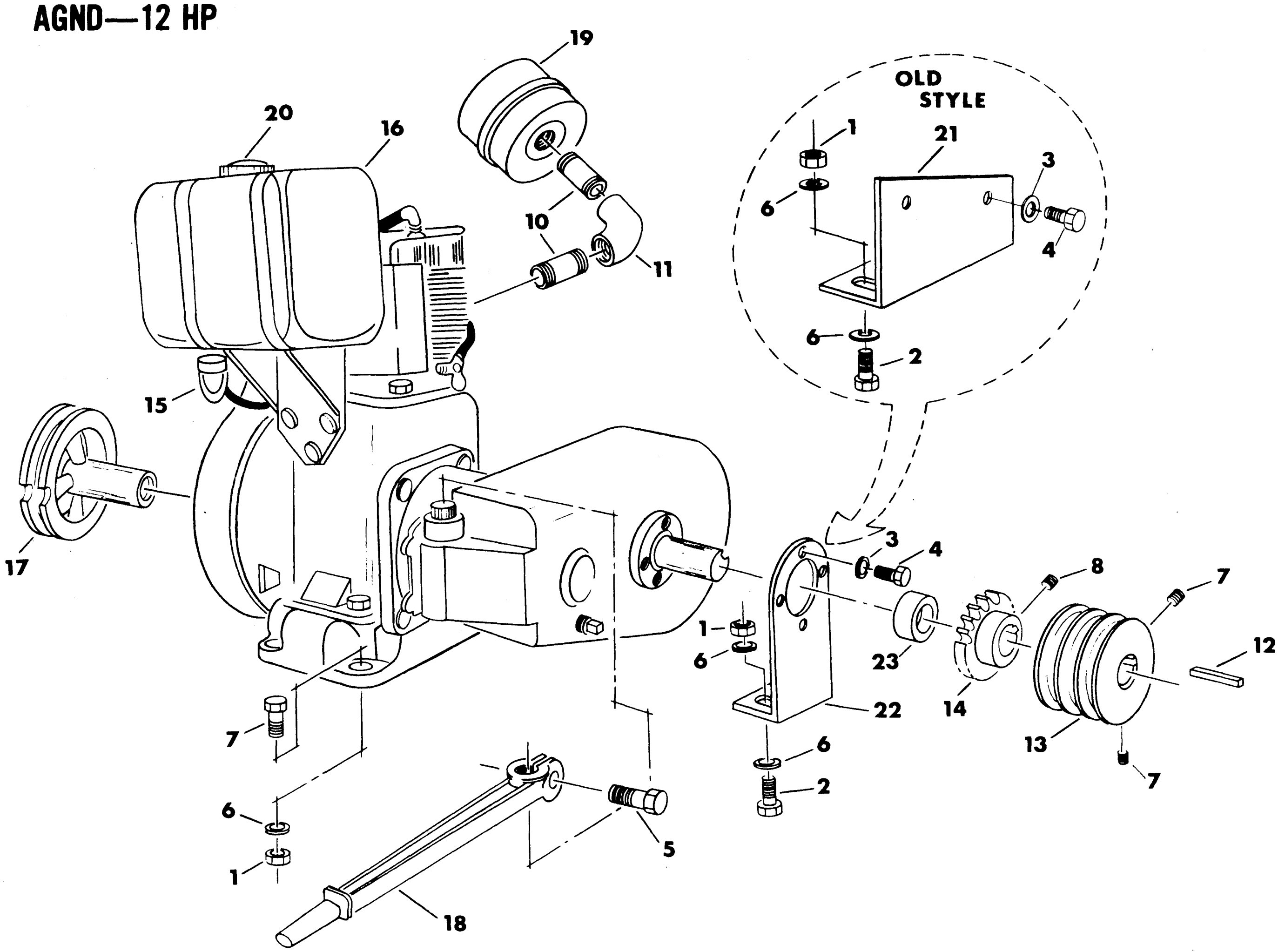
Ref. No.	Part Number	Qty.	Description
17.	195-229	1	Air Cleaner (dry)—w/element
	195-231		Air Cleaner Element
	195-201		Air Cleaner (oil)
18.	195-339	1	Wing Nut (1/4-NC)
19.	195-909	1	Clutch Lever
20.	195-918	1	Muffler
	196-012	1	Spark Arresting Muffler (optional)
21.	195-946	1	Cap (screw on)
	195-926	1	Cap (clip on)
22.	300-342	1	Reduction Support Bracket
23.	300-373	1	Engine Spacer
24.	360-441	1	Guard (M4E)
Not Shown:			
	195-115		Fuel Tank Mounting Bracket (RD TK)
	195-116		Fuel Tank Mounting Strap (RD TK)
	195-202		Fuel Strainer
	195-214		[1]Rewind Starter Conversion Kit
	195-237		[2]Rewind Starter Conversion Kit
	195-306		Outside Mount Gasket (oil type)
	195-307		Inside Mount Gasket (oil type)
	195-925		Starting Rope
	259-044		Tachometer

[1] Ends with S/N 126231 (ENGINE S/N 5789734).

[2] Begins with S/N 126232 (ENGINE S/N 5789735).

WISCONSIN ENGINE

AGND—12 HP

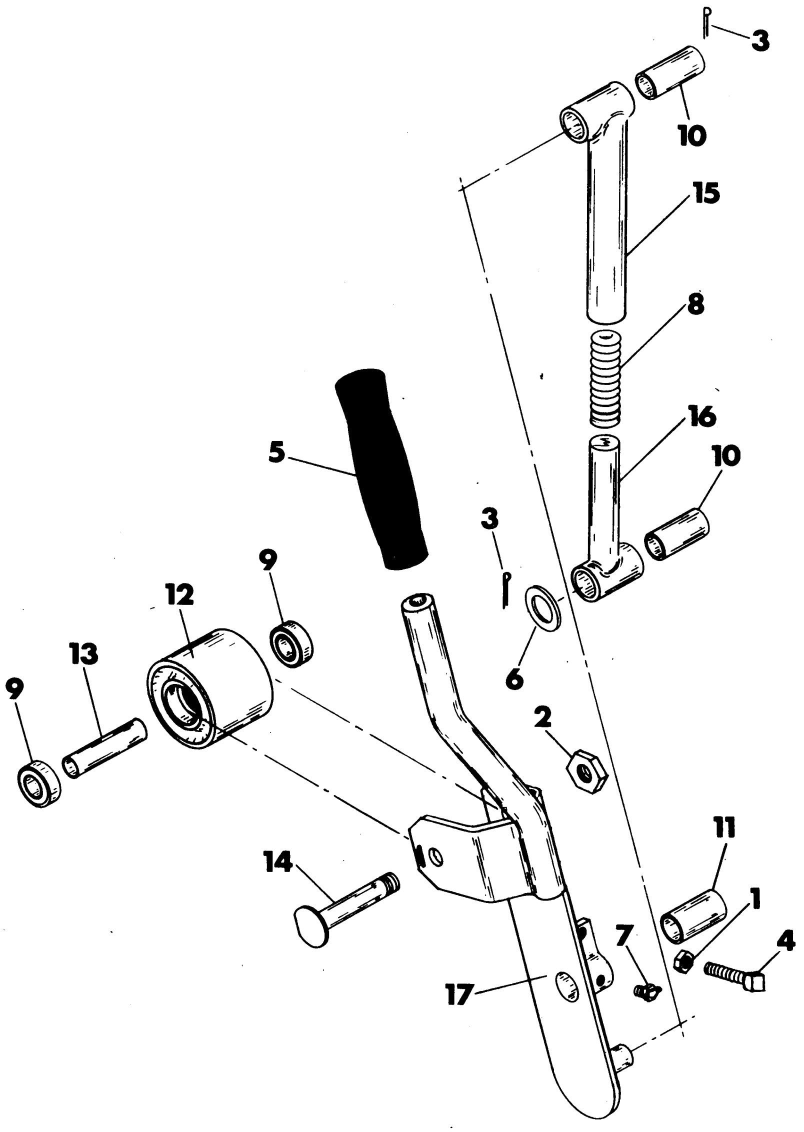


Ref. No.	Part Number	Qty.	Description
	195-203		Rope Start Engine (Incl. ref. no.'s 15 thru 19)
	195-205		Electric Start Engine
1.	105-047	6	Locknut (3/8-NC)
2.	105-052	2	Bolt (3/8-NC x 1-1/4")
3.	105-091	4	Lock Washer (5/16")
4.	105-094	4	Bolt (5/16-NC x 1")
5.	105-109	1	Bolt (5/16-NC x 1-1/2")
6.	105-118	8	Washer (3/8")
7.	105-150	4	Bolt (3/8-NC x 1-3/4")
8.	105-704	1	Setscrew (5/16-NC x 1/4")
	105-701	1	Setscrew (5/16-NC x 3/8")—replacements
9.	105-705	2	Setscrew (1/4-NC x 3/8")
10.	115-207	2	Pipe Nipple (1-1/4" x 2")
11.	115-209	1	Pipe Elbow (1-1/4")
12.	165-946	1	Key (3/8" SQ x 3")
13.	170-105	1	Sheave
14.	175-020	1	Sprocket (standard)
	175-024	1	Sprocket (high speed)
15.	195-202	1	Fuel Strainer
16.	195-220	1	Fuel Tank (Incl. ref. no. 20)
17.	195-226	1	Rope Start Pulley
18.	195-909	1	Clutch Lever

Ref. No.	Part Number	Qty.	Description
19.	195-916	1	Muffler
20.	195-946	1	Cap (screw on)
	110-010	1	Cap (clip on)
21.	300-334	1	[3]Support Bracket (5" LG)
	300-344	1	[2]Support Bracket (4-1/2" LG)
22.	300-335	1	[1]Support Bracket (11-1/8" LG)
23.	300-374	1	Engine Spacer
Parts Not Shown:			
	195-201		Air Cleaner (oil type)
	195-210		Flywheel (rope start)
	195-216		Air Cleaner Mounting Bracket
	195-217		Rectifier and Regulator (early models)
	195-229		Air Cleaner (dry)—w/element
	195-231		Air Cleaner Element
	195-232		Crankshaft (for dual clutch units)
	195-306		Outside Mounting Gasket (oil)
	195-307		Inside Mounting Gasket (oil)
	195-925		Starting Rope
	195-339		Wing Nut (1/4-NC)
	259-044		Tachometer

[1] Engine Spec. No. 385566 or 385567.
[2] Ends with S/N 121922.
[3] Begins with S/N 121923.

BELT CLUTCH

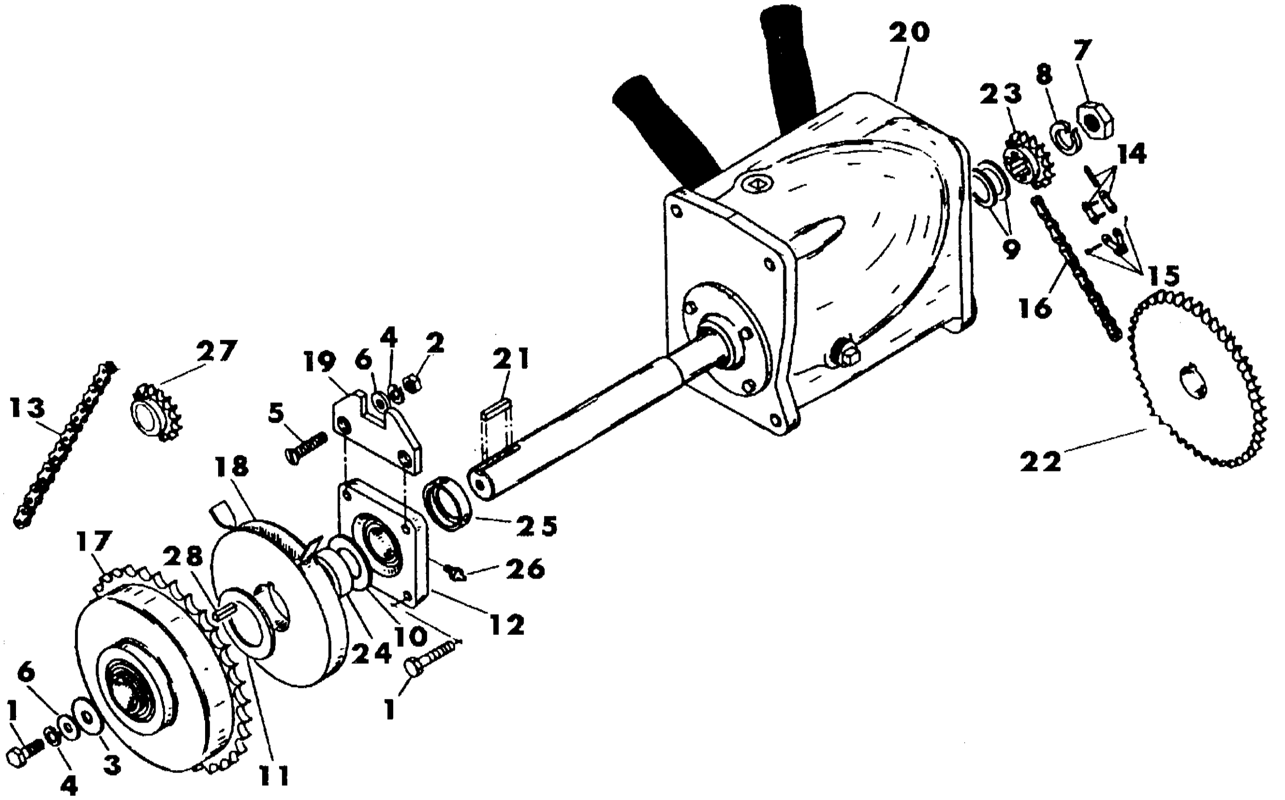


Ref. No.	Part Number	Qty.	Description
1.	105-053	1	Nut (3/8-NC)
2.	105-310	1	Jam Nut (3/4-NC)
3.	105-502	2	Cotter Pin (3/16" x 2")
4.	105-706	1	Setscrew (3/8-NC x 3", SQ HD)
	105-717	1	Setscrew (3/8-NC x 2-1/4", SQ HD)
5.	110-015	1	Handle Grip
6.	110-056	1	Machinery Bushing
7.	115-006	1	Zerk (1/4-NF x 45º)
8.	115-558	1	Spring
9.	125-007	2	Bearing

Ref. No.	Part Number	Qty.	Description
10.	125-402	2	Bronze Bushing
11.	125-411	1	Bronze Bushing
12.	170-304	1	Belt Idler Roller
13.	180-074	1	Roller Sleeve
14.	180-362	1	Roller Shaft
15.	360-981	1	Spring Tension Outer Arm
16.	360-982	1	Spring Tension Inner Arm
17.	360-986	1	Belt Clutch Arm

TRANSMISSION DRIVE TRAIN

(Not for S/N 125470 thru S/N 125927 and Ends with S/N 127342)



Ref. No.	Part Number	Qty.	Description
1.	105-052	4	Bolt (3/8-NC x 1-1/4")
2.	105-053	4	Nut (3/8-NC)
3.	105-071	5	Washer (1/2")
4.	105-072	6	Lock Washer (3/8")
5.	105-105	2	Bolt (3/8-NC x 1-1/2", CSK HD)
6.	105-118	5	Washer (3/8")
7.	105-388	1	Nut (3/4-NF)
8.	105-389	1	Lock Washer (3/4")
9.	110-055	2	Machinery Bushing (1-7/8" OD, 14 GA)
10.	110-056	1	Machinery Bushing (1-7/8" OD, 18 GA)
11.	110-168	1	Machinery Bushing (3-1/2" OD, 18 GA)
12.	125-606	1	Flange Bearing (Incl. ref. no.'s 54 and 56)
13.	130-007	1	Roller Chain (No. 40, 96 P)—9 HP
	130-008	1	Roller Chain (No. 40, 105 P)—12 HP
	130-012	1	Roller Chain (No. 40, 106 P) — 12 HP w/dual clutch
	130-001		Connector Link (No. 40)
	130-002		Offset Link (No. 40)
	130-017		Roller Link (No. 40)
14.	130-101		Connector Link (No. 50)
	130-203		Connector Link (No. 60)
	130-113		Roller Link (No. 50)
	130-206		Roller Link (No. 60)
15.	130-102		Offset Link (No. 50)
	130-202		Offset Link (No. 60)

Ref. No.	Part Number	Qty.	Description
16.	130-107	1	[2]Roller Chain (No. 50, 59 P)—Incl. ref. no.'s 14 and 15
	130-201	1	[3]Roller Chain (No. 60, 66 P)—Incl. ref. no.'s 14 and 15
17.	165-001	1	Reducer
18.	165-018	1	Reducer Shifter
19.	165-028	1	Dig Lock Plate
20.	165-039	1	[1]Transmission (Incl. ref. no.'s 7 and 8)
21.	165-911	1	Brass Key (5/16" SQ x 3/4")
22.	175-204	1	Sprocket (No. 50, 48 T)
	175-401	1	Sprocket (No. 60, 30 T)
23.	175-223	1	[2]Sprocket (No. 50, 11 T, 6 spline)
	175-222	1	[2]Sprocket (No. 50, 18 T, 6 spline)
	175-410	1	[3]Sprocket (No. 60, 9 T, 6 spline)
24.	300-337	1	Spacer
25.	125-704	1	Lock Collar (1-1/4" ID)
	105-704		Setscrew (5/16-NC x 1/4")
26.	115-001	1	Zerk (1/8-NPT, STR)
27.	175-019	1	Sprocket (No. 40, 15T)—9 HP
	175-020	1	Sprocket (No. 40, 18T)—12 HP
28.	165-913	1	Key (1/4" SQ x 7/8")

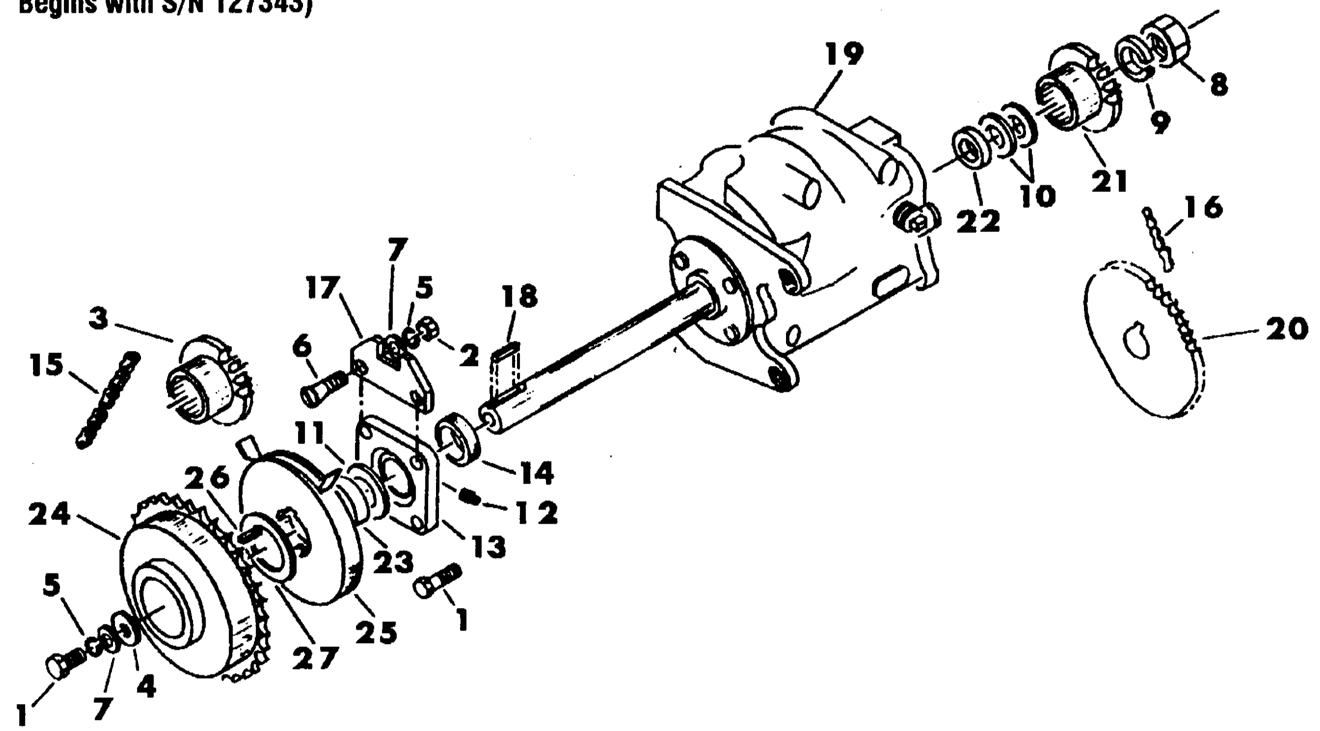
[1] This transmission is no longer available. If replacement is required refer to TRANSMISSION DRIVE TRAIN and TRANSMISSION MOUNT for S/N 125470 thru S/N 125927 and Begins with S/N 127343.

[2] These parts are for units equipped with rubber tires.

[3] These parts are for units equipped with track.

TRANSMISSION DRIVE TRAIN

(S/N 125470 thru S/N 125927 and Begins with S/N 127343)



Ref. No.	Part Number	Qty.	Description
1.	105-052	4	Bolt (3/8-NC x 1-1/4")
2.	105-053	4	Nut (3/8-NC)
3.	175-019	1	Sprocket (No. 40, 15T)—9 HP
	175-020	1	Sprocket (No. 40, 18T)—12 HP
4.	105-071	5	Washer (1/2")
5.	105-072	8	Lock Washer (3/8")
6.	105-105	2	Bolt (3/8-NC x 1-1/2", CSK HD)
7.	105-118	5	Washer (3/8")
8.	105-388	1	Nut (3/4-NF)
9.	105-389	1	Lock Washer (3/4")
10.	110-055	2	Machinery Bushing (1-7/8" OD, 14 GA)
11.	110-056	1	Machinery Bushing (1-7/8" OD, 18 GA)
12.	115-001	1	Zerk (1/8-NPT, STR)
13.	125-606	1	Flange Bearing (Incl. ref. no.'s 12 and 14)
14.	125-704	1	Lock Collar (1-1/4" ID)
	105-704		Setscrew (5/16-NC x 1/4")
	105-701		Setscrew (5/16-NC x 3/8") —replacements
15.	130-012	1	Roller Chain (No. 40, 106 P)
	130-001		Connector Link (No. 40)
	130-002		Offset Link (No. 40)
	130-017		Roller Link (No. 40)
16.	130-107	1	[2]Roller Chain (No. 50, 59 P)
	130-201	1	[3]Roller Chain (No. 60, 66 P)
	130-101		Connector Link (No. 50)
	130-203		Connector Link (No. 60)
	130-102		Offset Link (No. 50)
	130-202		Offset Link (No. 60)
	130-113		Roller Link (No. 50)
	130-206		Roller Link (No. 60)

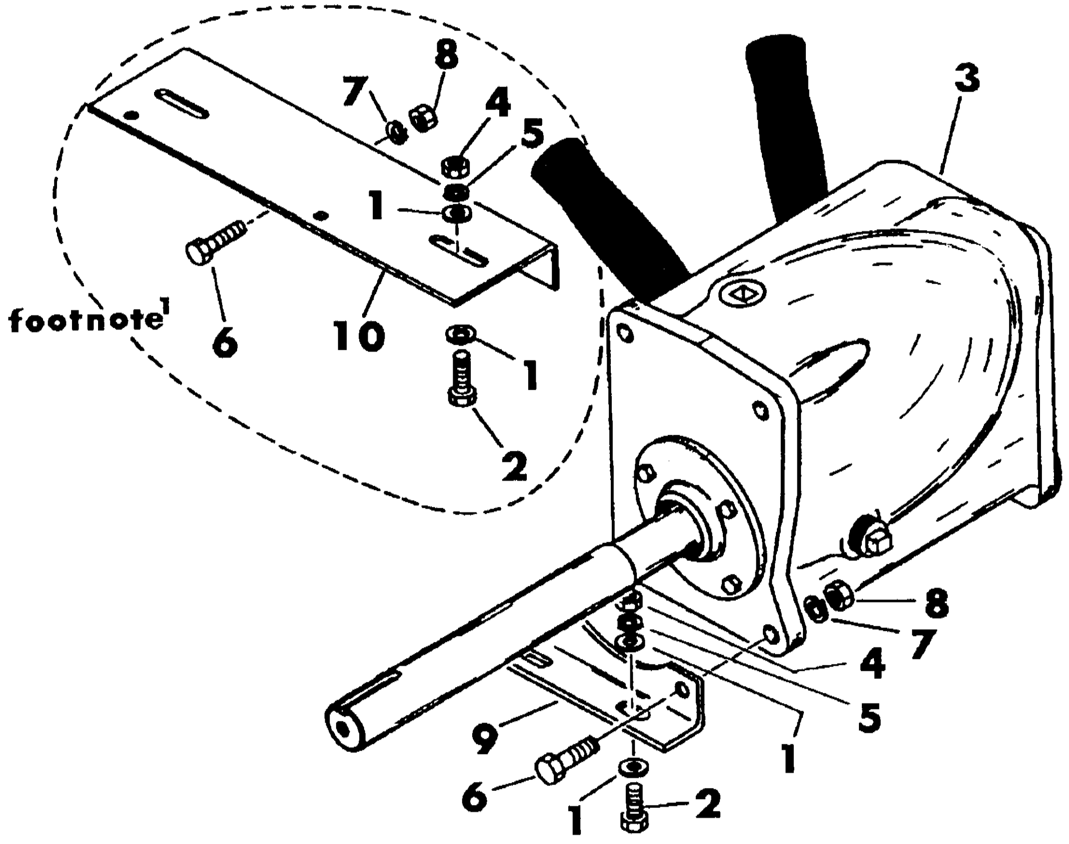
Ref. No.	Part Number	Qty.	Description
17.	165-028	1	Dig Lock Plate
18.	165-911	1	Brass Key (5/16" SQ x 3/4")
19.	166-034	1	Transmission (Incl. ref. no.'s 8 and 9)
	190-409		[1]Transmission Conversion Kit (Incl. ref. no.'s 10, 19 and 22)
20.	175-204	1	[2] Sprocket (No. 50, 48 T)
	175-401	1	[3]Sprocket (No. 60, 30 T)
21.	175-245	1	[2]Sprocket (No. 50, 11 T, 26 spline)
	175-246	1	[2]Sprocket (No. 50, 18 T, 26 spline)
	175-413	1	[3]Sprocket (No. 60, 9 T, 26 spline)
22.	181-344	1	Transmission Spacer
23.	300-337	1	Spacer
24.	165-001	1	Reducer
25.	165-018	1	Reducer Shifter
26.	165-913	1	Key (1/4" SQ x 7/8")
27.	110-168	1	Machinery Bushing (3-1/2" OD, 18 GA)

[1] This kit converts units with a Ford transmission to Chevy transmission. Refer to installation diagram 050-963 for a complete parts list and conversion instructions.

[2] These parts are used on units equipped with rubber tires.

[3] These parts are used on units equipped with track.

TRANSMISSION MOUNT
(Not for S/N 125470 thru S/N 125927 and Ends with S/N 127342)



Ref. No.	Part Number	Qty.	Description
1.	105-117	4	Washer (5/16")
2.	105-094	2	Bolt (5/16-NC x 1")
3.	165-039	1	[3]Transmission
4.	105-092	2	Nut (5/16-NC)
5.	105-091	2	Lock Washer (5/16")
6.	105-128	2	Bolt (7/16-NC x 1-1/4")
7.	105-073	2	Lock Washer (7/16")
8.	105-103	2	Nut (7/16-NC)
9.	300-300	1	[2]Bottom Transmission Bracket
10.	300-323	1	[1] Transmission Bracket

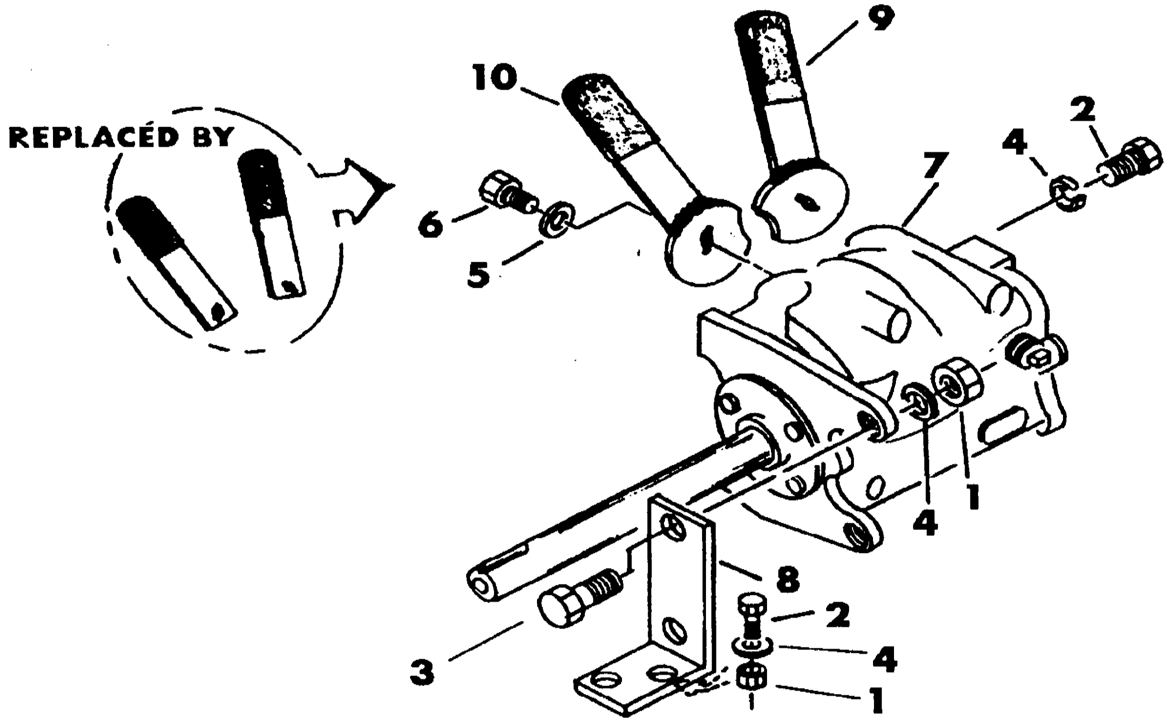
[1] Ends with S/N 121922.

[2] Begins with S/N 121923.

[3] This transmission is no longer available. If replacement is required refer to TRANSMISSION DRIVE TRAIN and TRANSMISSION MOUNT for S/N 125470 thru S/N 125927 and Begins with S/N 127343.

TRANSMISSION MOUNT

(S/N 125470 thru S/N 125927 and Begins with S/N 127343)

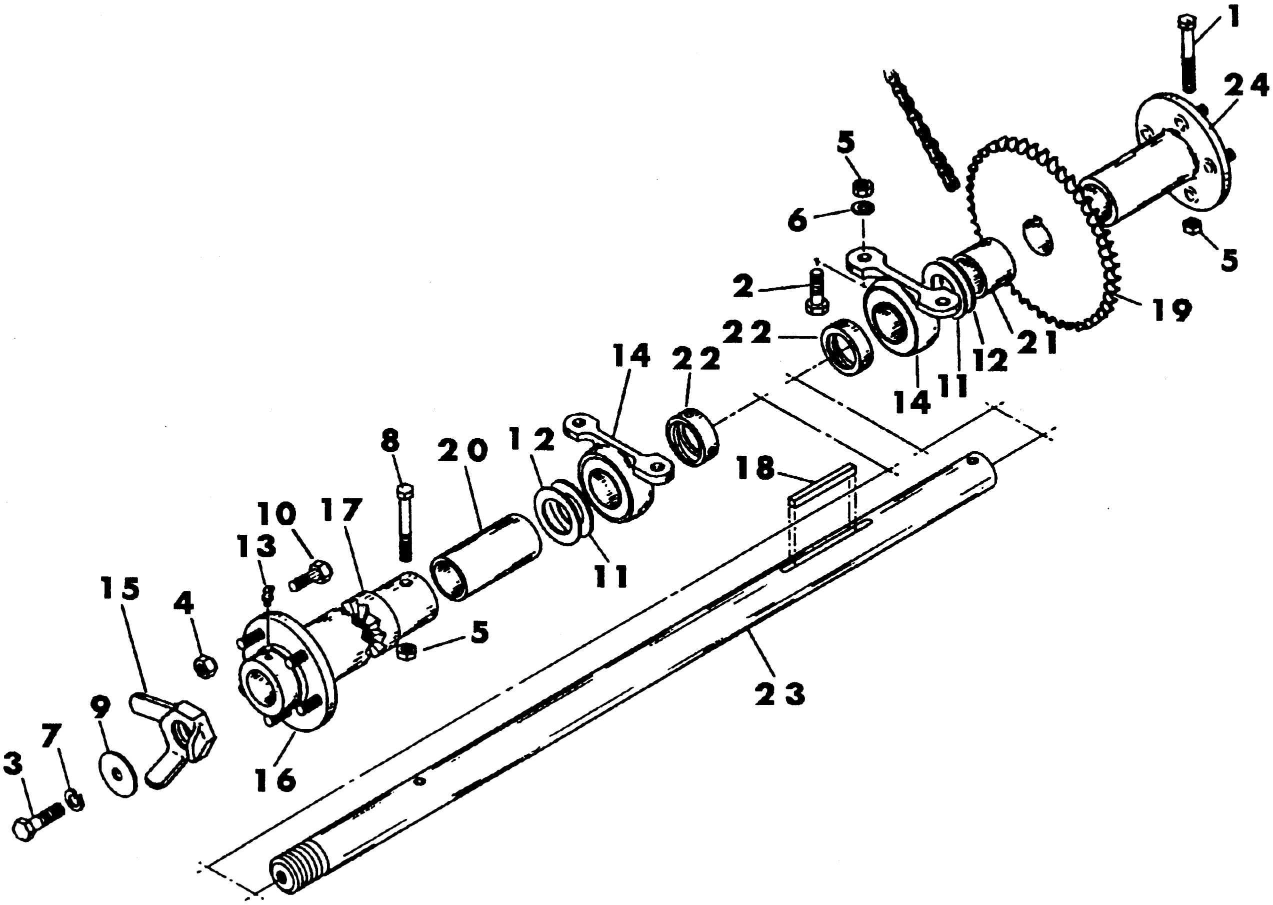


Ref. No.	Part Number	Qty.	Description
1.	105-021	4	Nut (1/2-NC)
2.	105-043	10	Bolt (1/2-NC x 1-1/4")
3.	105-066	2	Bolt (1/2-NC x 1-3/4")
4.	105-070	8	Lock Washer (1/2")
5.	105-072	8	Lock Washer (3/8")
6.	105-099	2	Bolt (3/8-NC x 7/8")
7.	166-034	1	Transmission (Incl. ref. no.'s 9 and 10)
	190-409		[1]Transmission Conversion Kit (Incl. ref. No.'s 1, 2, 3, 4, and 8)
8.	300-267	1	Transmission Mounting Bracket
9.	360-979	1	[2]Left Shift Lever
10.	360-980	1	[2]Right Shift Lever

[1] This kit converts units with Ford transmission to Chevy transmission. Refer to installation diagram 050-963 for complete parts list and conversion instructions.

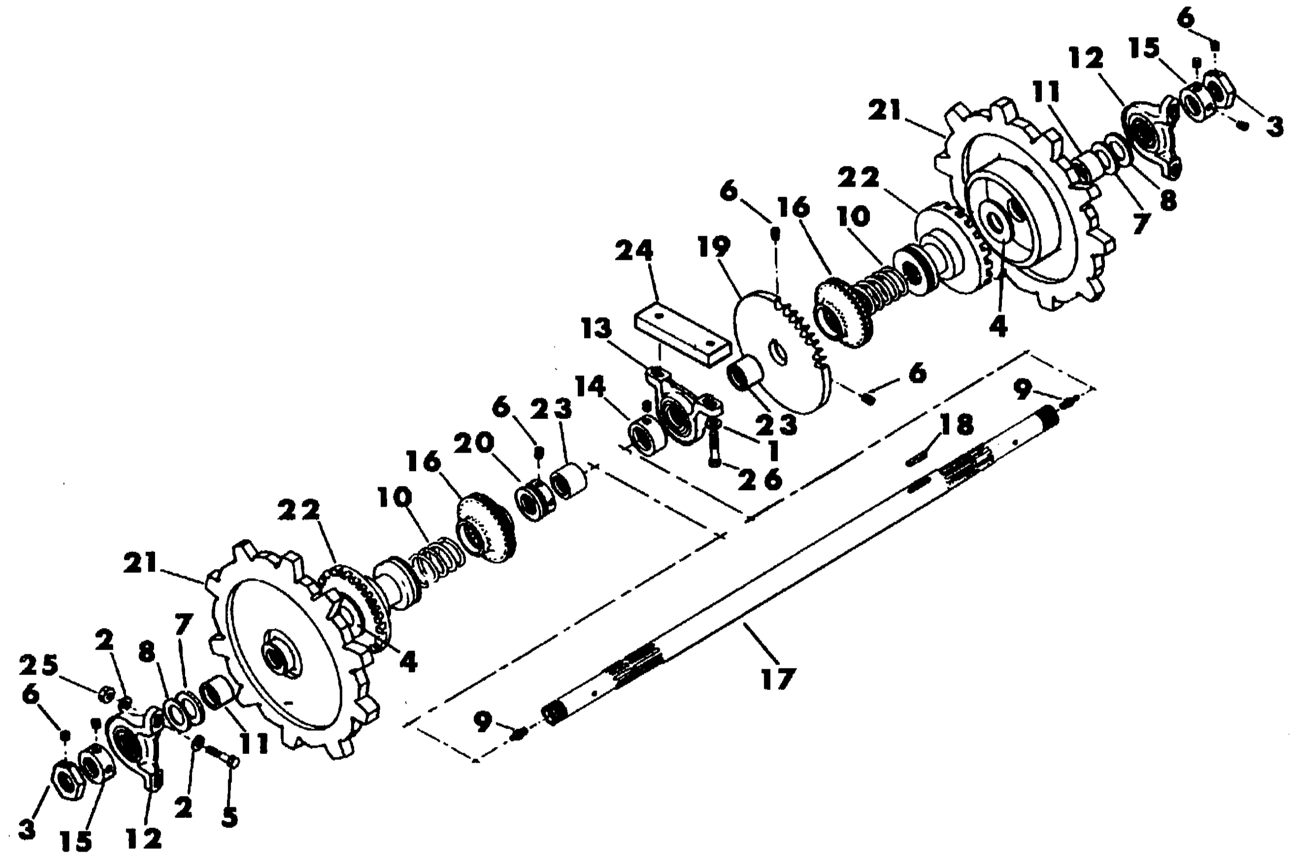
[2] If levers require replacement order transmission cap from page entitled TRANSMISSION (S/N 125470 thru S/N 125927 and Begins with S/N 127343).

DRIVE AXLE
M4 and M422



Ref. No.	No. Number	Qty.	Description
1.	105-002	1	Bolt (1/2-NC x 2-1/4")
2.	105-043	4	Bolt (1/2-NC x 1-1/4")
3.	105-052	4	Bolt (3/8-NC x 1-1/4")
4.	105-054	10	Lug Nut (7/16-NF)
	105-103	10	Nut (7/16-NC)—early models
5.	105-065	6	Locknut (1/2-NC)
6.	105-071	5	Washer (1/2")
7.	105-072	6	Lock Washer (3/8")
8.	105-082	1	Bolt (1/2-NC x 2-1/2")
9.	105-096	1	Washer
10.	105-171	10	Lug Bolt (7/16-NF x 1-3/8")
	105-128	10	Bolt (7/16-NC x 1-1/4")—early model
11.	110-007	2	Machinery Bushing (2-1/8" OD, 14 GA)
12.	110-172	2	Machinery Bushing (2-1/8" OD, 18 GA)
13.	115-004	1	Zerk (1/8-NPT x 45^{0})
14.	125-504	2	Pillow Block Bearing (Incl. ref. no. 22)
15.	160-816	1	Wheel Clutch Lock (single wheel)
	160-830	1	Wheel Clutch Lock (dual wheel)
16.	160-818	1	Wheel Clutch Hub (Incl. ref. no. 10)
17.	160-819	1	Wheel Clutch Lock
18.	165-924	1	Key (3/8" SQ x 1-3/4")
19.	175-204	1	Drive Sprocket
20.	300-371	1	Axle Spacer (3-7/8" LG)
21.	300-372	1	Axle Spacer (1-1/4" LG)
22.	125-707	2	Lock Collar (1-3/8" ID)
	105-702		Setscrew (3/8-NC x 3/8")
23.	165-348	1	Drive Axle
24.	160-820	1	Drive Wheel Hub (Incl. ref. no. 10)

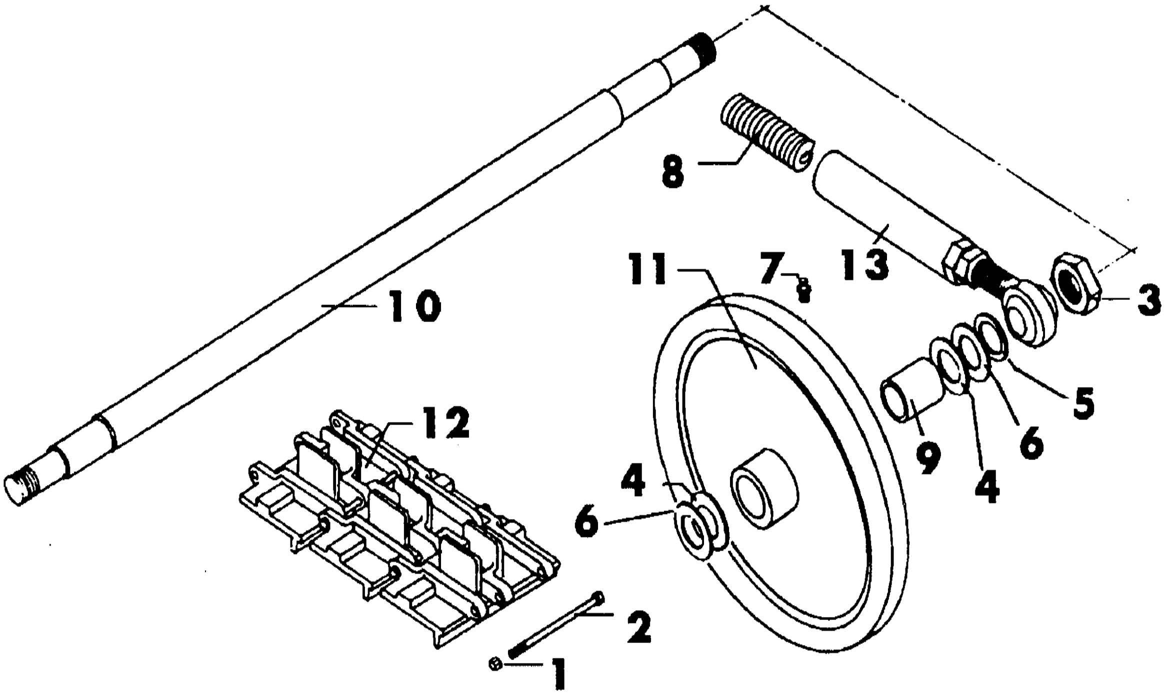
DRIVE AXLE
Crawler Units



Ref. No.	Part Number	Qty.	Description
1.	105-070	2	Lock Washer (1/2")
2.	105-071	4	Washer (1/2")
3.	105-308	2	Jam Nut (1-3/8-NC)
4.	105-409	2	Machinery Bushing (2-1/2" OD x 10 GA)
5.	105-048	4	Bolt (1/2-NC x 1-1/2")
6.	105-702	3	Setscrew (3/8-NC x 3/8")
7.	110-007	6	Machinery Bushing (2-1/8" OD x 14 GA)
8.	110-172	2	Machinery Bushing (2-1/8" OD x 18 GA)
9.	115-012	2	Zerk (1/4-NPT, STR)
10.	115-551	2	Compression Spring (3" LG)
11.	125-406	4	Bronze Bushing (1-5/8" OD x 2-1/2" LG)
12.	125-504	2	Pillow Block Bearing (1-3/8" ID) Incl. ref. no. 15
13.	125-511	1	Pillow Block Bearing (1-3/4" ID) Incl. ref. no. 14
	115-003		Zerk (1/4-NF, STR)

Ref. No.	Part Number	Qty.	Description
14.	125-705	1	Lock Collar (1-3/4" ID)
	105-702		Setscrew (3/8-NC x 3/8")
15.	125-707	2	Lock Collar (1-3/8" ID)
	105-702		Setscrew (3/8-NC x 3/8")
16.	155-817	2	Dust Boot Seal
17.	165-345	1	Drive Axle
18.	165-912	1	Key (1/2" SQ x 1-1/2")
19.	175-401	1	Axle Drive Sprocket (30 T)
20.	180-125	1	Dust Shield Hub
21.	300-351	2	Track Sprocket
22.	300-362	2	Steering Clutch
23.	300-370	2	Axle Sprocket Spacer
24.	300-386	1	Bearing Mount
25.	105-065	4	Locknut (1/2-NC)
26.	105-048	2	Bolt (1/2-NC x 1-1/2")

IDLER AXLE and WHEEL
Crawler Units



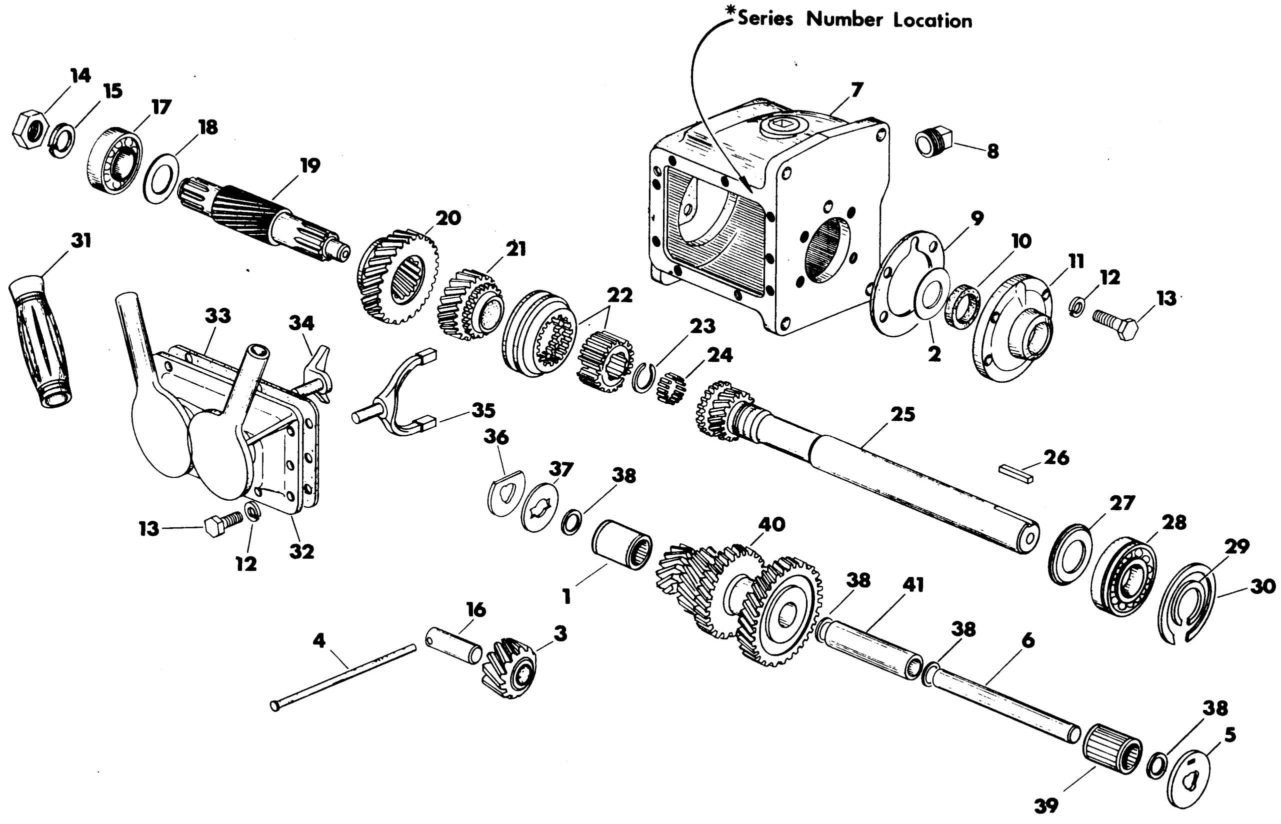
Ref. No.	Part Number	Qty.	Description
1.	105-047	40	Locknut (3/8-NC)
2.	105-100	40	Bolt (3/8-NC x 6")
3.	105-309	2	Jam Nut (1-1/8-NC)
4.	110-007	6	Machinery Bushing (2-1/8" OD x 14 GA)
5.	110-039	2	Machinery Bushing (1-3/4" OD x 14 GA)
6.	110-172	6	Machinery Bushing (2-1/8" OD x 18 GA)
7.	115-001	3	Zerk (1/8-NPT, STR)
8.	115-552	2	Compression Spring (7" LG)

Ref. No.	Part Number	Qty.	Description
9.	125-406	4	Bronze Bushing (1-5/8" OD x 2-1/2" LG)
10.	165-359	1	Idler Axle
11.	300-352	2	Track Idler Wheel
12.	300-354	40	Track Pad (with cleats)
	300-299		Track Pad (less cleats)
	300-353	2	Track Assembly (Incl. ref. no.'s 1, 2 and 12)
13.	300-356	2	Track Tension Assembly

TRANSMISSION

SERIES NO. 10

(Parts Only)



Ref. No.	Part Number	Qty.	Description
	165-035		[1]Transmission
1.	501-260	1	Roller Bearing
2.	110-172	1	Machinery Bushing
3.	501-239	1	Reverse Idler Gear (18 T)
4.	501-243	1	Shaft Retainer
5.	501-249	1	Thrust Washer
6.	501-244	1	Counter Shaft (3/4" OD)
7.	501-269	1	Case
8.	115-152	1	Pipe Plug (3/4")
9.	501-208	1	Retainer Gasket
10.	501-209	1	Seal
11.	501-270	1	Input Bearing Retainer
12.	105-091	13	Lock Washer (5/16")
13.	105-090	13	Bolt (5/16-NC x 3/4")
14.	105-388	1	Nut (3/4-NF)
15.	105-389	1	Lock Washer (3/4")
16.	501-246	1	Reverse Idler Shaft
17.	125-022	1	Output Bearing (Incl. snap ring)
18.	110-003	1	Machinery Bushing
19.	501-262	1	Output Shaft (6/16/6 spline, stamped 1912 on shaft)
20.	501-223	1	Low-Reverse Sliding Gear (29 T, 16 spline)
21.	501-226	1	Intermediate Gear (22 T)
22.	501-210	1	Hub and Collar
23.	501-254	1	Snap Ring
24.	501-213	1	Roller (15 per set)

(Continued on following page.)

TRANSMISSION (Cont'd.)

SERIES NO. 10

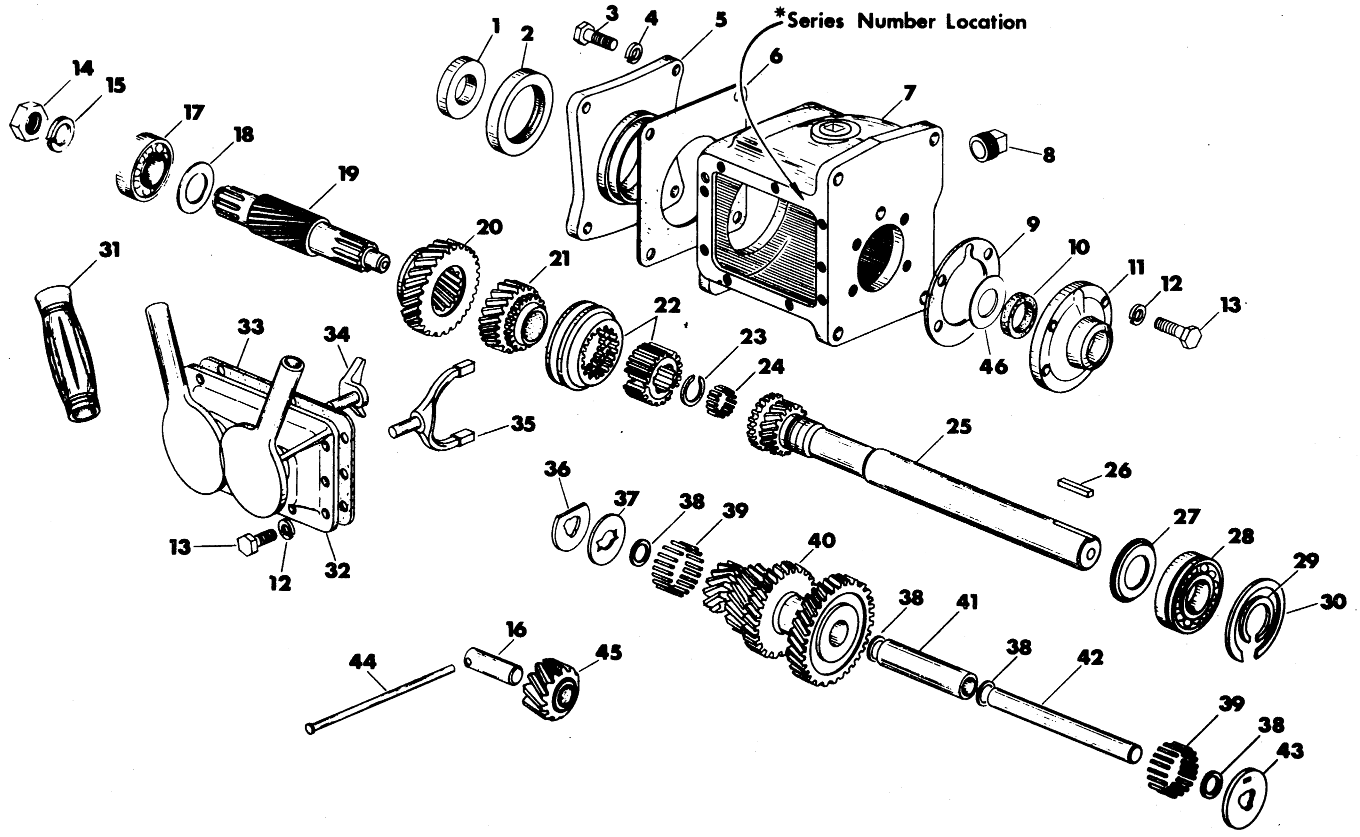
(Parts Only)

Ref. No.	Part Number	Qty.	Description
25.	501-263	1	Input Shaft (16 T, 2.281" OD)
	501-271	1	Input Shaft (15 T, 2.281" OD)
26.	165-911	1	Brass Key (5/16" SQ x 3/4")
	165-941	1	Brass Key (5/16" SQ x 1-1/2")—crawler
27.	501-255	1	Oil Baffle
28.	125-017	1	Bearing (Incl. ref. no. 30)
29.	501-253	1	Snap Ring
30.	501-252	1	Snap Ring
31.	110-016	2	Handle Grip
32.	501-264	1	Transmission Cap (Incl. levers)
	165-223		Levers
33.	501-211	1	Cap Gasket
34.	501-229	1	Lower Shift Fork
35.	361-029	1	Upper Shift Fork
36.	501-251	1	Thrust Washer
37.	501-250	1	Thrust Washer
38.	501-248	2	Spacer
39.	501-261	1	Roller Bearing (1.438" THK)—front
40.	501-237	1	Cluster Gear (28 T, 24 T, 17 T, 14 T)
	501-265	1	Cluster Gear (29 T, 24 T, 18 T, 14 T)
41.	501-266	1	Spacer

TRANSMISSION

SERIES NO. 20, 30, 40 and 50

(Parts Only)



Ref. No.	Part Number	Qty.	Description
	165 039		[1]Transmission
1.	180-212	1	Seal Spacer
2.	155 840	1	Internal Seal
3.	105-128	4	Bolt (7/16-NC x 1-1/4")
4.	105-073	4	Lock Washer (7/16")
5.	501 204	1	Output Bearing Retainer
6.	501 207	1	Retainer Gasket
7.	501 201	1	Case (20 and 30 series)
	501 202	1	Case (40 and 50 series)
8.	115-152	1	Pipe Plug (3/4", SQ HD)
9.	501 208	1	Retainer Gasket
10.	501 209	1	Seal
11.	501 205	1	Input Bearing Retainer
12.	105-091	10	Lock Washer (5/16")
13.	105-090	10	Bolt (5/16-NC x 3/4")
14.	105-388	1	Nut (3/4-NF)
15.	105-389	1	Lock Washer (3/4")
16.	501 246	1	Idler Shaft
17.	125 016	1	Ball Bearing
	125-034	1	Ball Bearing (replacements)
	501-030		Snap Ring
18.	110-003	1	Machinery Bushing
19.	501 217	1	Output Shaft (6/16/6 spline, stamped 2532 on shaft)—for 20 series
	501 218	1	Output Shaft (6/16/6 spline, stamped 2592 on shaft)—for 30, 40 and 50 series
20.	501 223	1	Low-Reverse Gear (29 T, 16 spline)—for 20 series
	501 224	1	Low-Reverse Gear (28 T, 16 spline, 1/4" groove)—for 30 and 40 series
	501 225	1	Low-Reverse Gear (28 T, 16 spline, 3/8" groove)—for 50 series

(Continued on following page.)

TRANSMISSION (Cont'd.)
SERIES NO. 20, 30, 40 and 50
(Parts Only)

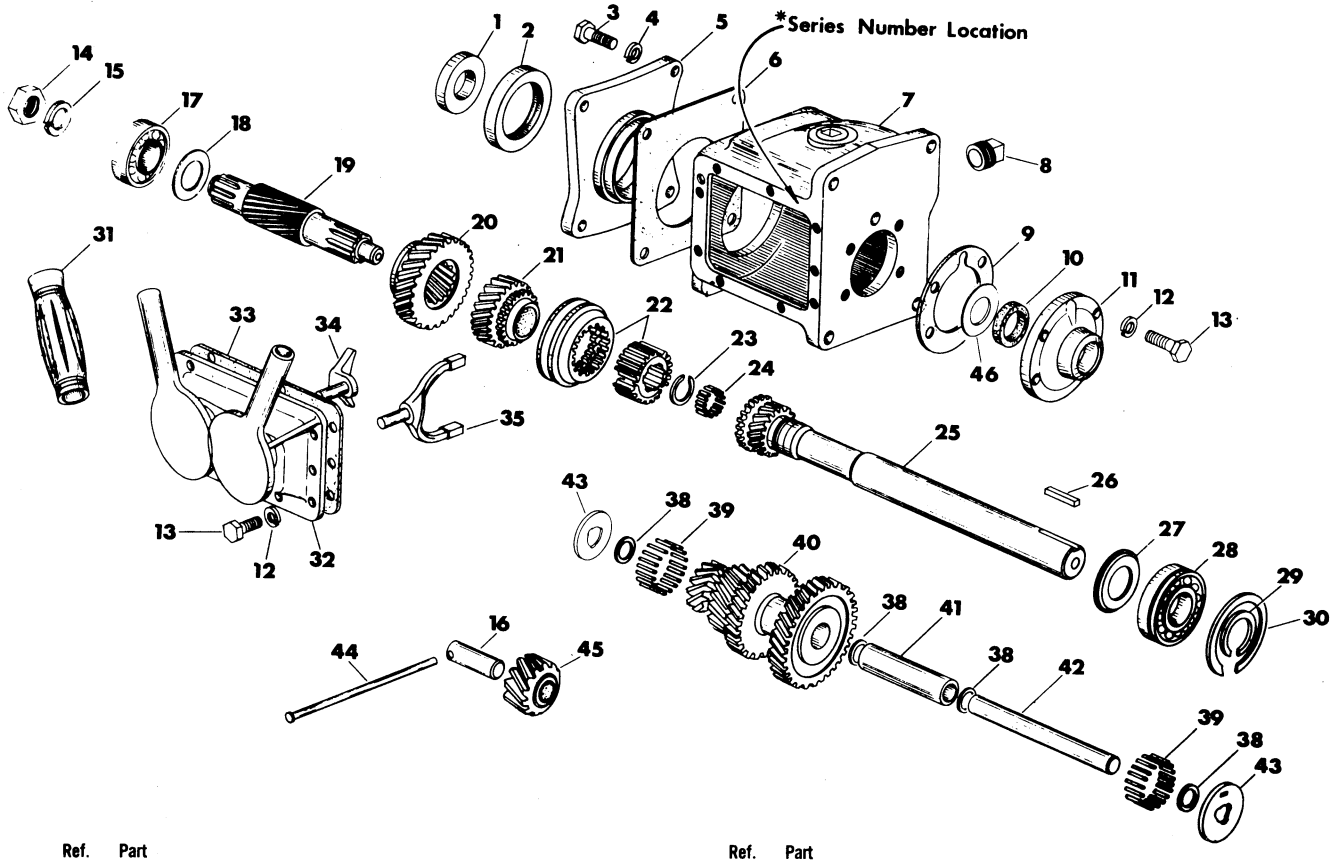
Ref. No.	Part Number	Qty.	Description
21.	501-226	1	Second Gear (22 T)—for 20 series
	501-227	1	Second Gear (22 T)—for 30 and 40 series
	501-228	1	Second Gear (23 T)—for 50 series
22.	501-210	1	Synchronizer
23.	501-254	1	Snap Ring
24.	501-213	1	Roller Bearing (15 per set)
25.	501-219	1	Input Shaft (16 T, 2.337" OD)—for 20 series
	501-220	1	Input Shaft (16 T, 2.525" OD)—for 30 and 40 series
	501-221	1	Input Shaft (16 T, 2.562" OD)—for 50 series
26.	165-911	1	Brass Key (5/16" SQ x 3/4")
	165-941	1	Brass Key (5/16" SQ x 1-1/2")
27.	501-025	1	Oil Baffle
28.	125-016	1	Bearing (Incl. ref. no. 30)
	125-034	1	Bearing (replacements)
29.	501-253	1	External Snap Ring
30.	501-030	1	Internal Snap Ring
31.	110-016	2	Handle Grip
32.	501-206	1	Transmission Cap (Incl. ref. no. 31)
	165-223		Lever
33.	501-211	1	Cap Gasket
34.	501-229	1	Low-Reverse Fork (20, 30 and 40 series)
	501-230	1	Low-Reverse Fork (50 series)
35.	360-940	1	Clutch Fork
36.	501-251	1	Thrust Washer (20 and 30 series)
37.	501-250	1	Thrust Washer (20 and 30 series)
	501-242	1	Thrust Washer (40 and 50 series)
38.	501-248	4	Spacer (20 and 30 series)
	501-247	4	Spacer (40 and 50 series)
39.	501-214	2	Roller Bearing (20 and 30 series)
	501-215	2	Roller Bearing (40 and 50 series)
40.	501-233	1	Cluster Gear (25 T, 22 T, 17 T, 14 T)—for 50 series
	501-234	1	Cluster Gear (27 T, 23 T, 17 T, 14 T)—for 40 series
	501-235	1	Cluster Gear (27 T, 23 T, 17 T, 13 T)—for 30 series
	501-236	1	Cluster Gear (1" ID)—for 20 series
	501-237	1	Cluster Gear (28 T, 24 T, 17 T, 14 T, 1-1/8" ID)—for 20 series
41.	501-267	1	Spacer (20 and 30 series)
	501-268	1	Spacer (40 and 50 series)
42.	501-244	1	Counter Shaft (3/4" OD)—for 20 and 30 series
	501-245	1	Counter Shaft (7/8" OD)—for 40 and 50 series
43.	501-249	1	Thrust Washer (20 and 30 series)
	501-242	1	Thrust Washer (40 and 50 series)
44.	501-243	1	Shaft Retainer
45.	501-239	1	Idler Gear (18 T)—for 20 series
	501-240	1	Idler Gear (17 T, 2.515" OD)—for 30 series
	501-241	1	Idler Gear (17 T, 2.525" OD)—for 40 and 50 series
46.	110-172	1	Machinery Bushing

[1] This transmission is no longer available if replacement is required order conversion kit and appropriate transmission sprocket from page entitled TRANSMISSION DRIVE TRAIN — (S/N 125470 thru S/N 125927 and Begins with S/N 127343), and refer to installation instructions 050-963.
Refer to assembly instruction 052-173. When ordering individual parts, first determine series number of transmission. To accomplish this, remove cap and cap gasket and note series numbers stamped in upper right hand corner.

TRANSMISSION

SERIES NO. 60-A and 70 (G, H, J, M, N)

(Parts Only)



Ref. No.	Part Number	Qty.	Description
	165-039		[1]Transmission
1.	180-212	1	Seal Spacer
2.	155-840	1	Internal Seal
3.	105-128	4	Bolt (7/16-NC x 1-1/4")
4.	105-073	4	Lock Washer (7/16")
5.	501-204	1	Output Bearing Retainer
6.	501-207	1	Retainer Gasket
7.	501-202	1	Case (7/8" pin)—No. 70
	501-203	1	Case (7/8" countershaft)—No. 60-A
8.	115-152	1	Pipe Plug (3/4", SQ HD)
9.	501-208	1	Retainer Gasket
10.	501-209	1	Seal
11.	501-205	1	Input Bearing Retainer (No. 70)
	501-212	1	Input Bearing Retainer (No. 60-A)
12.	105-091	13	Lock Washer (5/16")
13.	105-090	13	Bolt (5/16-NC x 3/4")
14.	105-388	1	Nut (3/4-NF)
15.	105-389	1	Lock Washer (3/4")
16.	501-246	1	Idler Shaft
17.	125-016	1	Output Bearing
	125-034	1	Output Bearing (replacement)
	501-030		Snap Ring
18.	110-003	1	Machinery Bushing
19.	501-390	1	Output Shaft (6/31/32 spline)—for 70 series designated G, H, J and M
	501-391	1	Output Shaft (6/32/32 T)—for No. 60-A and 70 series designated N
20.	501-382	1	Low-Reverse Gear (32 T, 31 spline)—for 70 series designated G, H, J and M
	501-383	1	Low-Reverse Gear (28 T, 32 spline)—for 70 series designated N
21.	501-227	1	Second Gear (22 T)—for 70 series designated H, J and N
	501-228	1	Second Gear (23 T)—for 60-A and 70 series designated G and M
22.	501-392	1	Synchronizer

(Continued on following page.)

TRANSMISSION (Cont'd.)

SERIES NO. 60-A and 70 (G, H, J, M, N)

(Parts Only)

Ref. No.	Part Number	Qty.	Description
23.	501-254	1	Snap Ring
24.	501-213	1	Roller Bearing (15 per set)
25.	501-385	1	Input Shaft (19 T)—for 70 series designated G
	501-386	1	Input Shaft (20 T)—for 70 series designated H
	501-387	1	Input Shaft (21 T)—for 70 series designated J
	501-388	1	Input Shaft (18 T)—for 70 series designated M
	501-389	1	Input Shaft (17 T)—for 70 series designated N
	501-222	1	Input Shaft (17 T, 1.574" BRG SHLD)—for 60-A series designated N
26.	165-911	1	Brass Key (5/16" SQ x 3/4")
	165-941	1	Brass Key (5/16" SQ x 1-1/2")
27.	501-025	1	Oil Baffle (No. 70)
	501-255	1	Oil Baffle (No. 60-A)
28.	125-016	1	Bearing (Incl. ref. no. 30)—No. 70
	125-034	1	Bearing (Incl. ref. no. 30)—replacement No. 70
	125-017	1	Bearing (Incl. ref. no. 30)—No. 60-A
29.	501-253	1	External Snap Ring
30.	501-030	1	Internal Snap Ring (3.028" OD)—No. 70
	501-252	1	Internal Snap Ring (3.406" OD)—No. 60-A
31.	110-016	2	Handle Grip
32.	501-206	1	Transmission Cap (Incl. ref. no. 31)
	165-223		Lever
33.	501-211	1	Cap Gasket
34.	501-230	1	Low-Reverse Fork
35.	360-940	1	Clutch Fork
38.	501-247	4	Spacer
39.	501-215	2	Roller Bearings (25 per set)

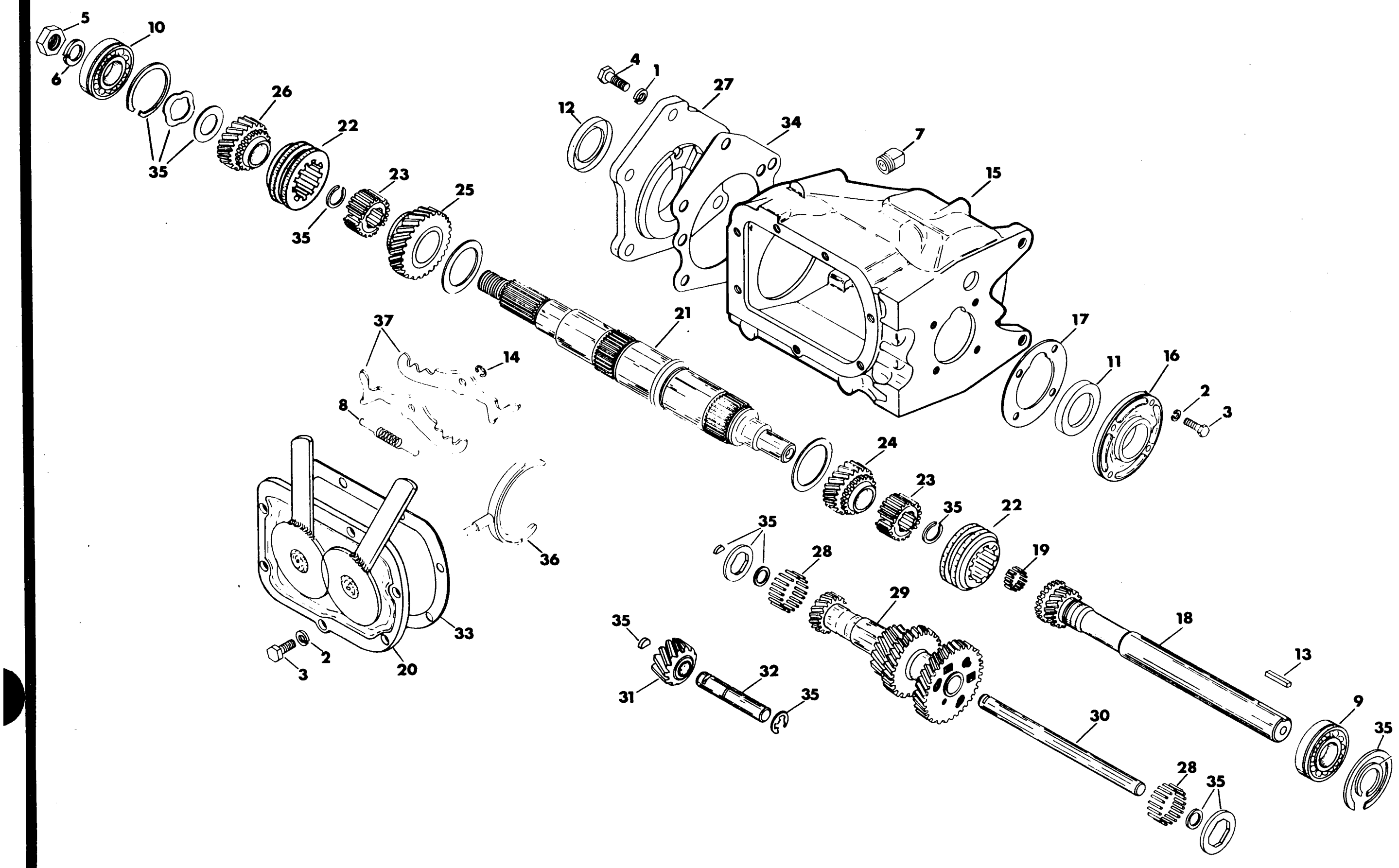
Ref. No.	Part Number	Qty.	Description
40.	501-376	1	Cluster Gear (32 T, 23 T, 19 T, 16 T)—for 70 series designated G
	501-377	1	Cluster Gear (31 T, 22 T, 19 T, 16 T)—for 70 series designated H
	501-378	1	Cluster Gear (30 T, 22 T, 19 T, 16 T)—for 70 series designated J
	501-379	1	Cluster Gear (33 T, 22 T, 19 T, 16 T)—for 70 series designated M
	501-380	1	Cluster Gear (33 T, 23 T, 17 T, 14 T)—for 70 series designated N
	501-231	1	Cluster Gear (24 T, 23 T, 17 T, 14 T)—for 60-A series
	501-232	1	Cluster Gear (24 T, 22 T, 17 T, 14 T)—for 60-A series
41.	501-268	1	Spacer
42.	501-245	1	Counter Shaft
43.	501-242	2	Thrust Washer
44.	501-243	1	Shaft Retainer
45.	501-381	1	Idler Gear (19 T)—for 70 series designated G, H, J and M
	501-241	1	Idler Gear (17 T)—for 60-A and 70 series designated N
46.	110-172	1	Machinery Bushing

[1] This transmission is no longer available if replacement is required order conversion kit and appropriate transmission sprocket from page entitled TRANSMISSION DRIVE TRAIN — (S/N 125470 thru S/N 125927 and Begins with S/N 127343), and refer to installation instructions 050-963.

Refer to assembly instructions 052-173. When ordering individual parts, first determine series number of transmission. To accomplish this, remove cap and cap gasket and note series number stamped in upper right hand corner.

TRANSMISSION

(S/N 125470 thru S/N 125927 and Begins with S/N 127343)



Ref. No.	Part Number	Qty.	Description
	166-034		Transmission (Incl. ref. no.'s 1 thru 37)
1.	105-073	5	Lock Washer (7/16")
2.	105-091	11	Lock Washer (5/16")
3.	105-094	11	Bolt (5/16-NC x 1")
4.	105-128	5	Bolt (7/16-NC x 1-1/4")
5.	105-388	1	Nut (3/4-NF)
6.	105-389	1	Lock Washer (3/4")
7.	115-152	1	Pipe Plug (3/4-NPT, SQ HD)
8.	115-614	1	Extension Spring
9.	125-034	1	Bearing (1.37" ID)
10.	125-035	1	Bearing (1.18" ID)
	125-022	1	Bearing (replacements)
11.	155-884	1	Internal Seal (1-3/4" OD)
12.	155-885	1	Internal Seal (3" OD)
13.	165-911	1	Brass Key (5/16" SQ x 3/4")
14.	500-046	1	External Retaining Ring

(Continued on following page.)

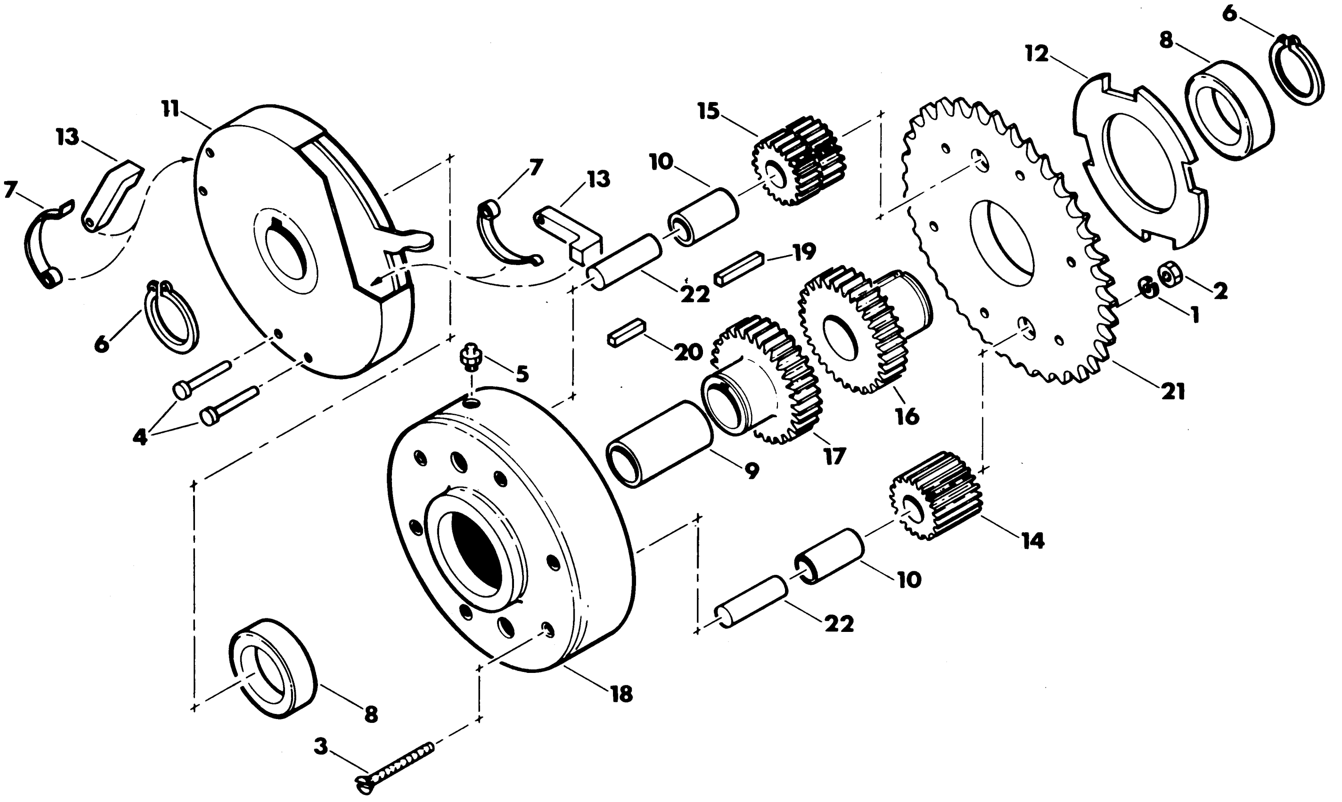
TRANSMISSION (Cont'd.)

(S/N 125470 thru S/N 125927 and
Begins with S/N 127343)

Ref. No.	Part Number	Qty.	Description
15.	501-393	1	Case
16.	501-394	1	Front Bearing Retainer
17.	501-395	1	Retainer Gasket
18.	501-396	1	Drive Gear and Shaft (19/30 T)
19.	501-397	1	Roller Bearing (14 per set)
20.	501-398	1	Transmission Cap (Incl. ref. no.'s 8, 14 and 37)
21.	501-399	1	Output Shaft (26 T, 36 T & 36 T)
22.	501-419	2	Sleeve
23.	501-420	2	Hub Gear
24.	501-421	1	Main Shaft Second Gear (30 T & 24 curved spline)
25.	501-489	1	Main Shaft First Gear (30 T & 29 curved spline)
26.	501-490	1	Main Shaft Reverse Gear (30 T & 28 curved spline)
27.	501-491	1	Rear Bearing Retainer
28.	501-492	2	Roller Bearing (27 per set)
29.	501-493	1	Cluster Gear (28 T, 21 T, 15 T, 14 T)
30.	501-494	1	Counter Shaft
31.	501-495	1	Reverse Idler Gear (17 T)
32.	501-496	1	Reverse Idler Shaft
33.	501-497	1	Cap Gasket
34.	501-498	1	Retainer Gasket
35.	501-499	1	Small Parts Kit
36.	501-502	2	Shift Fork
37.	501-597	1	Interlock Lever (pair)

REDUCER ASSEMBLY

(Ends with S/N 125749)

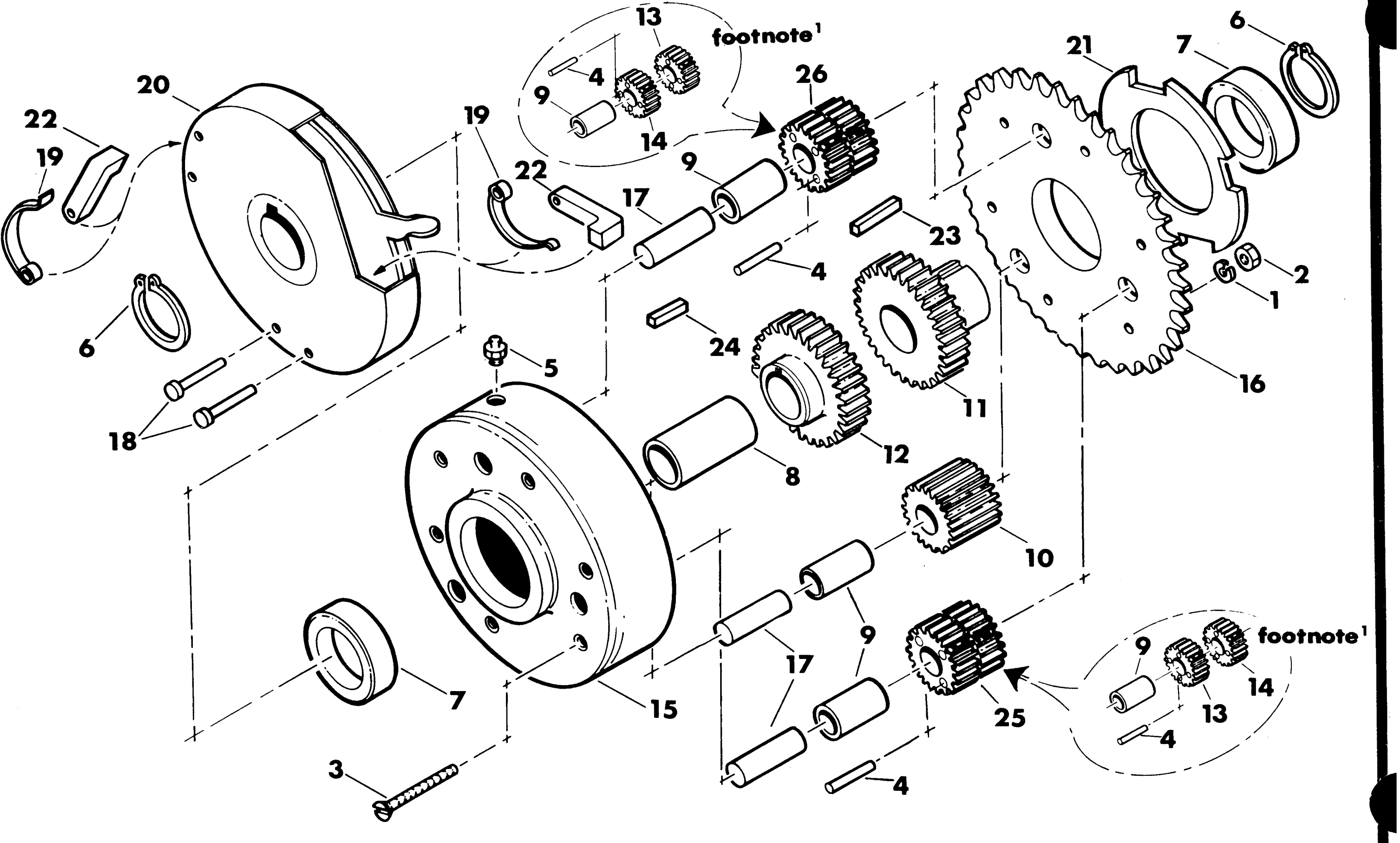


Ref. No.	Part Number	Qty.	Description
	N.A.		[1]Reducer Assembly
1.	105-091	6	Lock Washer (5/16")
2.	105-092	6	Nut (5/16-NC)
3.	105-102	6	Bolt (5/16-NC x 2-1/2", CSK SLT HD)
4.	110-163	4	Clevis Pin (1/4")
5.	115-001	1	Zerk (1/8-NPT, STR)
6.	115-460	2	External Snap Ring
7.	115-571	2	Torsion Spring
8.	125-001	2	Ball Bearing
9.	125-401	1	Bronze Bushing (1-1/4" ID)
10.	125-402	2	Bronze Bushing (3/4" ID)
11.	165-018	1	Reducer Shifter (Incl. ref. no.'s 4, 7 and 13)
12.	165-027	1	Lock Plate
13.	165-029	2	Lock Pin
14.	165-051	1	Straight Planet Gear
15.	165-052	1	Offset Planet Gear
16.	165-053	1	Sun Gear (40 T)
17.	165-054	1	Sun Gear (39 T)
18.	165-202	1	Reducer Housing
19.	165-913	1	Key (1/4" SQ x 7/8")
20.	165-911	1	Brass Key (5/16" SQ x 3/4")
21.	175-002	1	Reducer Sprocket (60 T, 5/8" THK)
22.	180-303	2	Reducer Pinion Shaft

[1] If replacement of this reducer is required order reducer assembly from page titled Reducer Assembly — Begins with S/N 125750.

REDUCER ASSEMBLY

(Begins with S/N 125750)



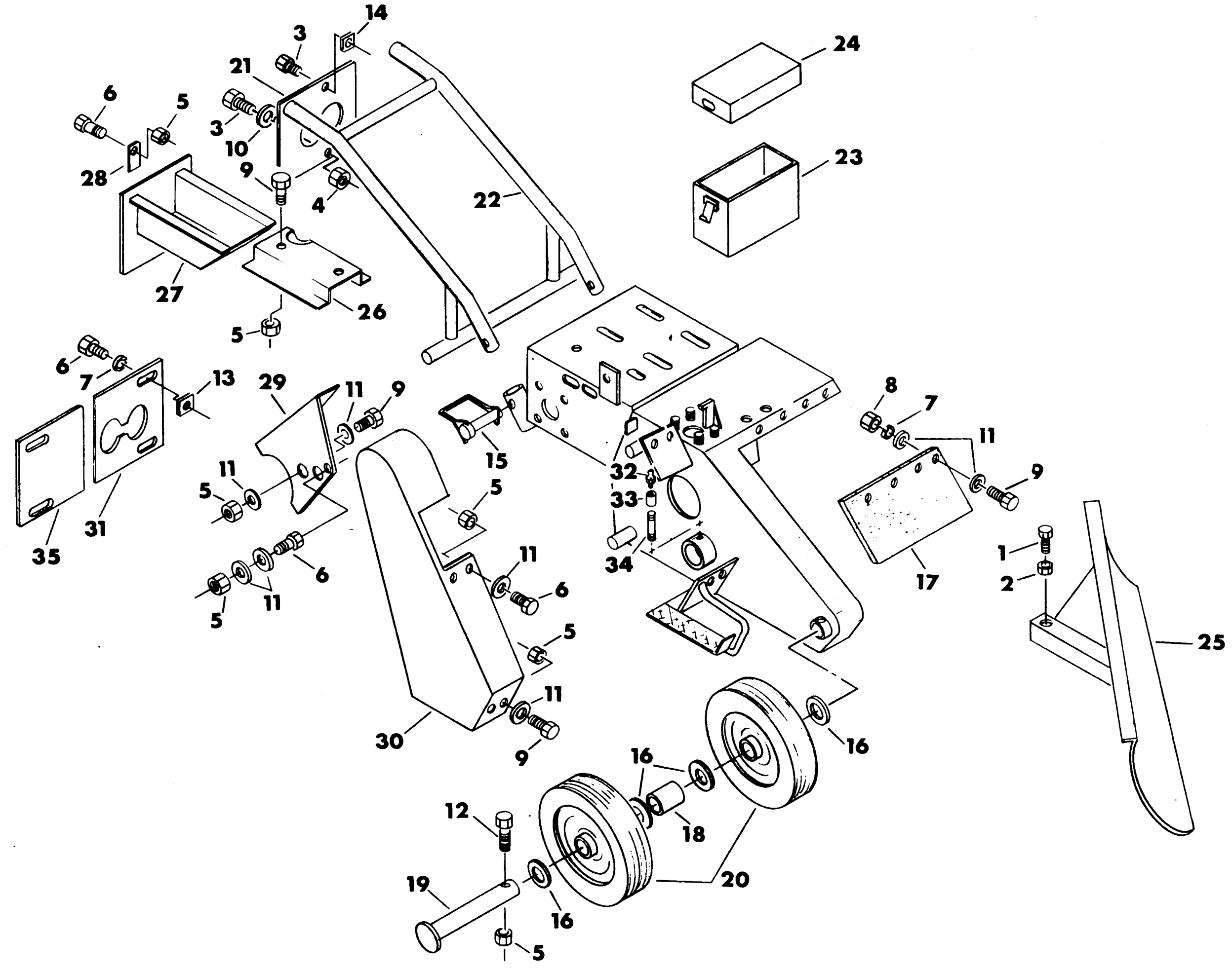
Ref. No.	Part Number	Qty.	Description
	165-001		Reducer Assembly (Incl. ref. no.'s 1 thru 12, 15, 16, 17, 21, 25 and 26)
	165-005		[1]Reducer and Shifter (Incl. ref. no.'s 1 thru 12, 15 thru 23, 25 and 26)
1.	105-091	6	Lock Washer (5/16")
2.	105-092	6	Nut (5/16-NC)
3.	105-102	6	Bolt (5/16-NC x 2-1/2", CSK SLT HD)
4.	105-516	8	[1]Roll Pin (3/16" x 1-1/2")
5.	115-001	1	Zerk (1/8-NPT, STR)
6.	115-460	2	External Snap Ring
7.	125-001	2	Bearing
8.	125-401	1	Bronze Bushing (1-1/4" ID)
9.	125-402	3	Bronze Bushing (3/4" ID)
10.	165-051	1	Planet Gear
11.	165-053	1	Sun Gear (40 T)
12.	165-054	1	Sun Gear (39 T)
13.	165-065	2	[1]Straight Planet Gear
14.	165-066	2	[1]Offset Planet Gear

Ref. No.	Part Number	Qty.	Description
15.	165-275	1	Reducer Housing
16.	175-051	1	Sprocket (60 T, 1/4" THK)
17.	180-303	3	Reducer Pinion Shaft
18.	110-163	4	Clevis Pin (1/4")
19.	115-571	2	Torsion Spring
20.	165-018	1	Reducer Shifter (Incl. ref. no.'s 18, 19 and 22)
21.	165-027	1	Lock Plate
22.	165-029	2	Lock Pin
23.	165-913	1	Key (1/4" SQ x 7/8")
24.	165-911	1	Brass Key (5/16" SQ x 3/4")
25.	165-086	1	[2]Right Offset Gear (Incl. ref. no.'s 4 and 9)
26.	165-085	1	[2]Left Offset Gear (Incl. ref. no.'s 4 and 9)

[1] Ends with S/N 127324. Planet gears (ref. no.'s 13 and 14) are no longer available order offset gears (ref. no.'s 25 or 26).

[2] Begins with S/N 127325. Offset gears (ref. no.'s 25 or 26) replace gears (ref. no.'s 13 and 14). These gears must be offset to the outside. Refer to assembly instructions 052-177.

FRAME PARTS



Ref. No.	Part Number	Qty.	Description
1.	105-031	1	Bolt (3/8-NC x 1")
2.	105-053	2	Nut (3/8-NC)
3.	105-865	2	Bolt (1/4-NC x 3/4", GD 8)
4.	105-085	1	Locknut (1/4-NC)
5.	105-089	11	Locknut (5/16-NC)
6.	105-090	4	Bolt (5/16-NC x 3/4")
7.	105-091	4	Lock Washer (5/16")
8.	105-092	4	Nut (5/16-NC)
9.	105-094	10	Bolt (5/16-NC x 1")
10.	105-095	1	Washer (1/4")
11.	105-117	18	Washer (5/16")
12.	105-130	1	Bolt (5/16-NC x 2-1/4")
13.	105-137	4	[3]Clip Nut (5/16-NC)
14.	105-139	1	Clip Nut (1/4-NC)
15.	110-032	2	Clip Pin
16.	110-055	4	Machinery Bushing
17.	115-316	1	Spoils Flap
18.	180-124	1	Spacer (dual trail wheel)
19.	180-363	1	Axle (8.5" LG)—single trail wheel
	180-450	1	Axle (16.5" LG)—dual trail wheel

(Continued on following page.)

FRAME PARTS (Cont'd.)

Ref. No.	Part Number	Qty.	Description
20.	205-769	2	Super Rib Trail Tire and Wheel (4.80/4.00-8, 2-ply)—Incl. tire, tube, wheel and bearing
	N.A.		[4]Dual Trail Wheel Conversion Kit (Incl. tire assembly and ref. no.'s 7, 8, 12, 16, 18 and 19)
	205-079		Tire (4.80/4.00-8, 2-ply)
	205-216		Trail Wheel (Incl. bearing)
	205-152		Tube (4.00 x 8)
	125-225		Bearing (Incl. retainers)
21.	300-322	1	[2]Transmission Cover Plate
22.	300-324	1	Handlebar
23.	300-330	1	Battery Box (M4E and M422E)
24.	300-331	1	Battery Box Lid (M4E and M422E)
25.	300-333	1	Backfill Blade
26.	300-336	1	[2]Tool Box Guide
	300-350	1	[1]Tool Box Guide

Ref. No.	Part Number	Qty.	Description
27.	300-345	1	Tool Box
28.	360-077	1	Tool Box Clip
29.	360-404	1	Gear Reduction Guard (M4)
	360-407	1	Gear Reduction Guard (M422 and MCR)
30.	360-408	1	Belt Guard (M422 and MCR)
	360-412	1	Belt Guard (M4)
31.	360-538	1	[3]Transmission Cover Plate
32.	115-001	1	Zerk (1/8-NPT, STR)
33.	115-172	1	Pipe Collar (1/8")
34.	115-184	1	Pipe Nipple (1/8" x 6")
35.	362-317	1	[3]Transmission Cover Plate

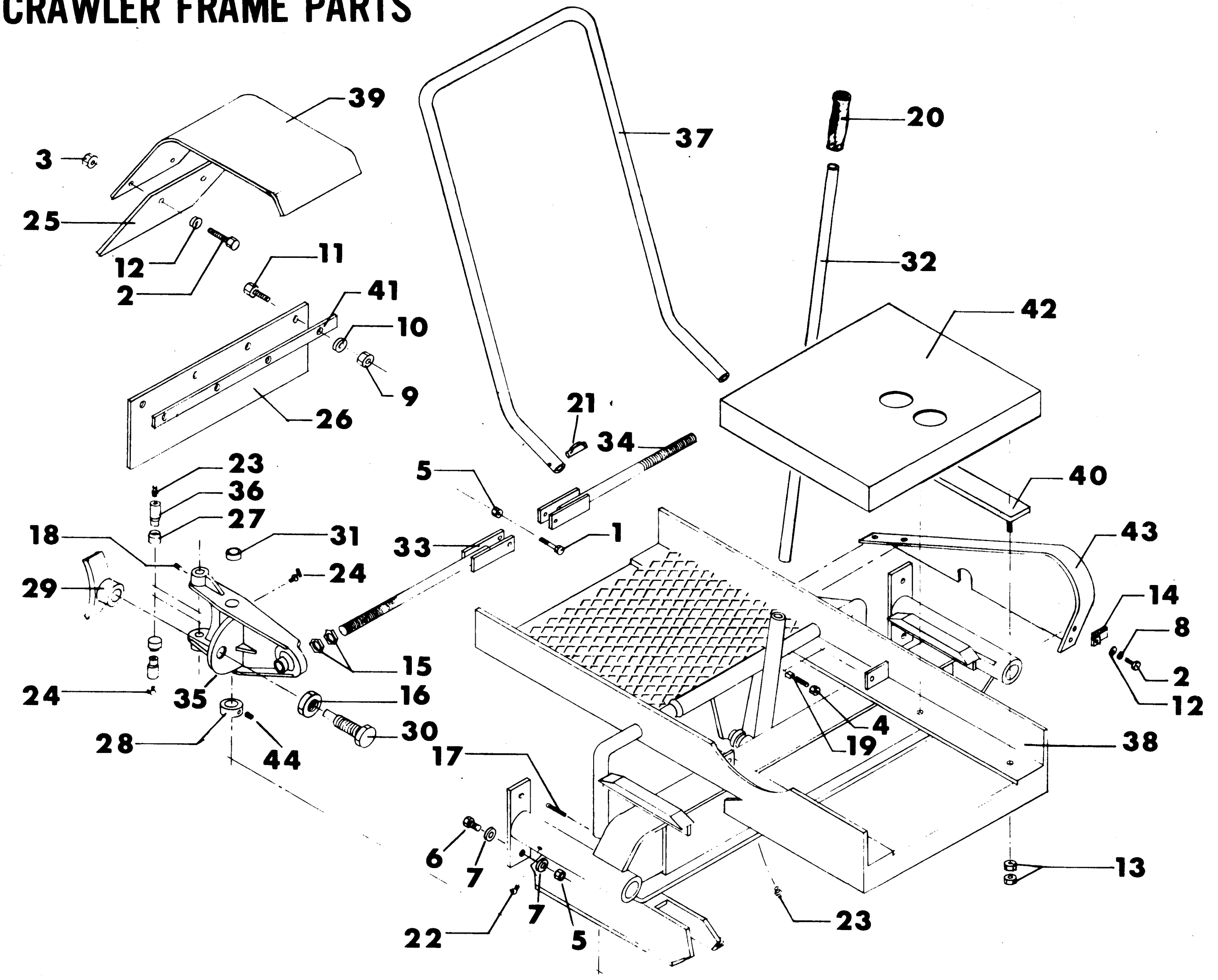
[1] Ends with S/N 121922.

[2] S/N 121923 thru S/N 127342.

[3] S/N 125470 thru 125927 on MCR and M422. Begins with S/N 127343 on all machines. Two piece cover arrangment (ref. no.'s 31 and 35) replaces early style single piece cover.

[4] Refer to installation diagram 050-905.

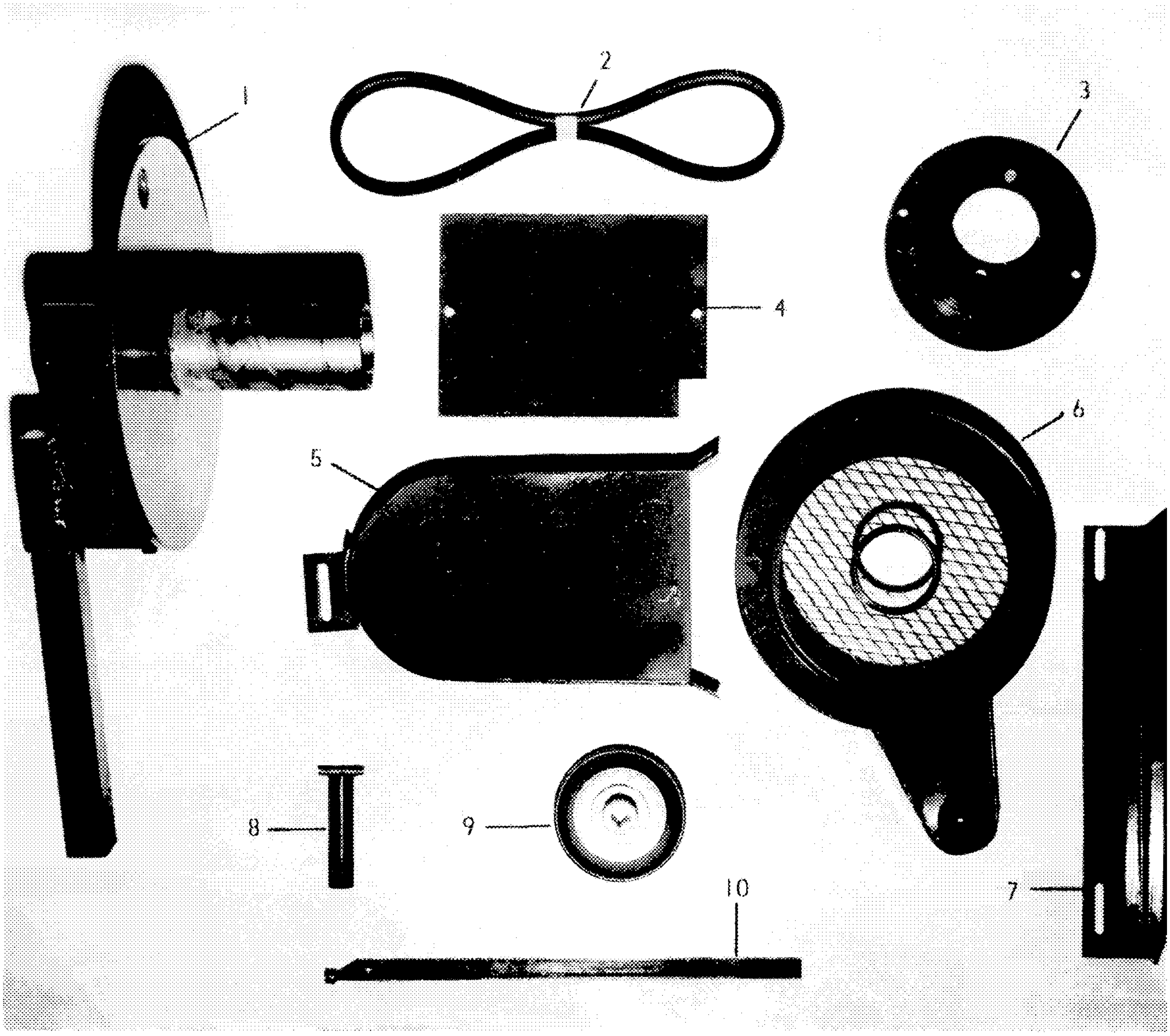
CRAWLER FRAME PARTS



Ref. No.	Part Number	Qty.	Description
	N.A.		[1]Crawler Conversion Kit
1.	105-002	1	Bolt (1/2-NC x 2-1/4")
2.	105-031	6	Bolt (3/8-NC x 1")
3.	105-047	2	Locknut (3/8-NC)
4.	105-053	2	Nut (3/8-NC)
5.	105-065	4	Locknut (1/2-NC)
6.	105-066	4	Bolt (1/2-NC x 1-3/4")
7.	105-071	8	Washer (1/2")
8.	105-072	4	Lock Washer (3/8")
9.	105-089	4	Locknut (5/16-NC)
10.	105-091	4	Lock Washer (5/16")
11.	105-094	4	Bolt (5/16-NC x 1")
12.	105-118	6	Washer (3/8")
13.	105-151	8	Locknut (7/16-NC)
14.	105-260	4	Clip Nut (3/8-NC)
15.	105-310	4	Jam Nut (3/4-NC)
16.	105-378	2	Jam Nut (1-NF)
17.	105-502	2	Cotter Pin (3/16" x 2")
18.	105-702	2	Setscrew (3/8-NC x 3/8")
19.	105-706	2	Setscrew (3/8-NC x 3")
20.	110-015	1	Handle Grip
21.	110-032	2	Clip Pin
22.	115-002	2	Zerk (1/8-NPT x 90°)
23.	115-003	3	Zerk (1/4-NF, STR)
24.	115-005	5	Zerk (1/4-NF x 90°)
25.	115-321	1	Spoils Flap (5" WD x 8" LG)
26.	115-322	1	Spoils Flap (6" WD x 18" LG)
27.	125-264	4	Bearing Cap
28.	125-704	2	Lock Collar
	105-704		Setscrew (5/16-NC x 1/4")
	105-701		Setscrew (5/16-NC x 3/8")—replacements
29.	160-608	2	Brake Shoe
30.	180-428	2	Adjusting Screw
31.	300-289	2	Axle Stop
32.	300-355	1	Steering Handle
33.	300-357	1	Steering Rod (15-3/4" LG)
34.	300-358	1	Steering Rod (14-3/4" LG)
35.	300-359	1	Right Clutch Yoke
	300-360	1	Left Clutch Yoke
36.	300-361	4	Throwout Bearing Pin
37.	300-364	1	Handlebar
38.	300-378	1	Track Frame
39.	300-383	1	Spoils Auger Hood
40.	300-384	2	Mounting Strap
41.	300-389	1	Spoils Flat Plate
42.	300-392	1	Base Plate
43.	360-469	1	Chain Guard
44.	105-705	1	Setscrew (1/4-NC x 3/8")

[1] Refer to installation diagram 050-932 for parts and instructions for converting machines with tires to machines with tracks.

FRAME HYDRAULIC PARTS



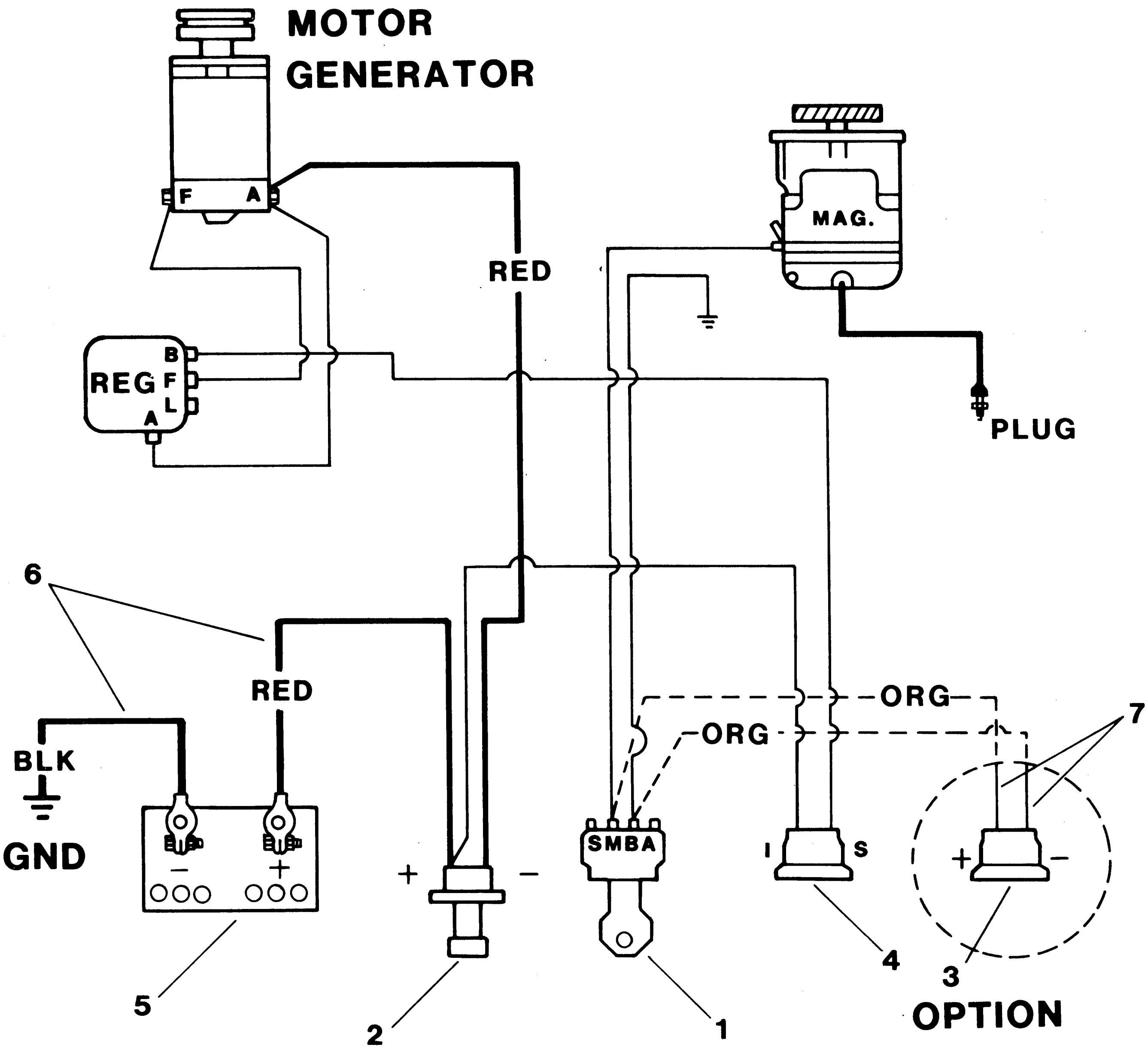
Ref. No.	Part Number	Qty.	Description
1.	145-419	1	[1]Pivot (12")
	145-418	1	[1]Pivot (12")—replacements
2.	170-012	1	Belt
3.	360-033	1	Pump Mounting Bracket
4.	360-440	1	Compartment Cover
5.	360-429	1	Pump Belt Guard
6.	360-433	1	Auxilliary Drive Belt Guard
7.	360-432	1	Transmission Bracket
8.	180-356	1	Cylinder Pin
9.	170-108	1	Sheave
10.	361-016	1	Valve Lever

[1] Replacement pivot must have pivot pin relocated to be used in this application.

ELECTRICAL DIAGRAM

M4: WISCONSIN AENLD (Electric Start)

(Ends with S/N 126231)



Ref. No.	Part Number	Qty.	Description
1.	215-005	1	Ignition Switch
	215-020		Keys
2.	215-006	1	Push Button Starter Switch
3.	215-102	1	Hour Meter (optional)
	105-189	3	Screw (No. 6-32)
	215-128	1	Hour Meter (optional)
4.	215-101	1	Ammeter (bolt on)
	215-138	1	Ammeter (clamp on)

Ref. No.	Part Number	Qty.	Description
5.	215-254	1	Battery
6.	215-307	2	Battery Cable (20")
7.	215-517	2	Wire (16 GA x 6")—used with hour meter

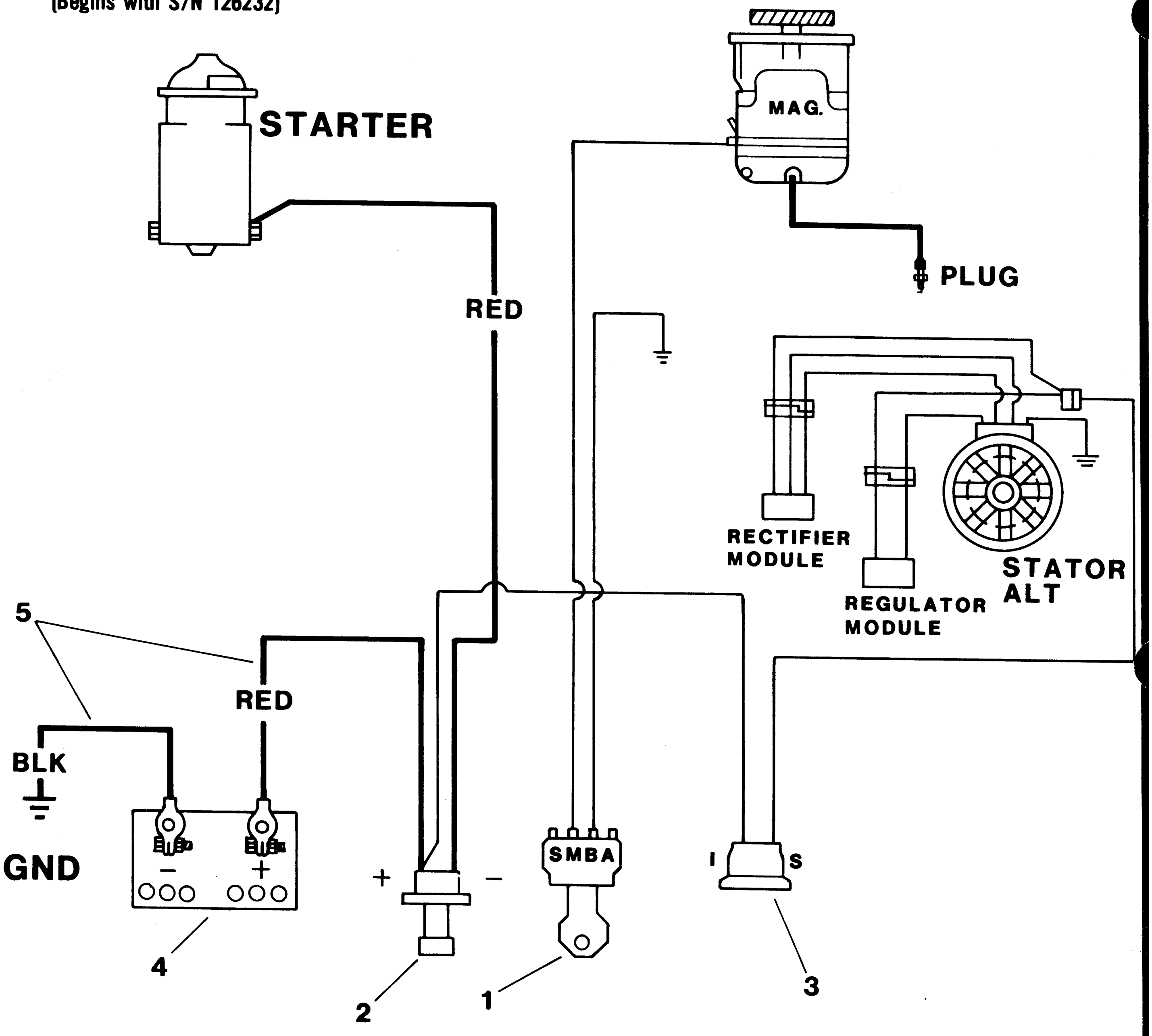
Not Shown:

195-106		[1]Electric Starter Conversion Kit
215-415		Light Kit (optional)

[1] Refer to installation diagram MY—60—10.

* Electrical schematic 050-801.

ELECTRICAL DIAGRAM
M4: WISCONSIN AENLD (Electric Start)
(Begins with S/N 126232)

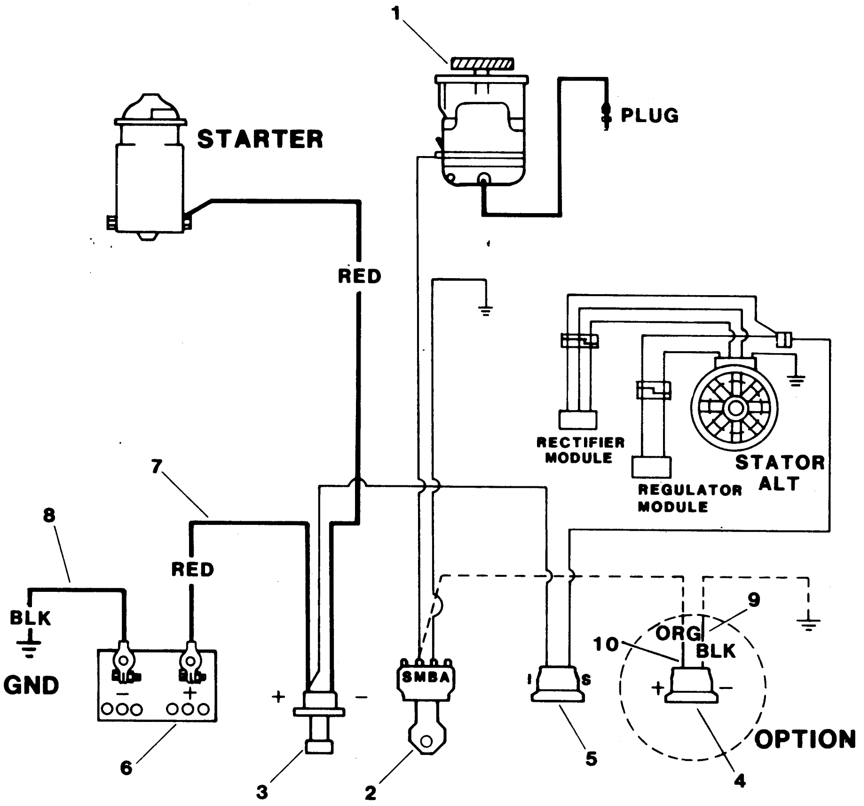


Ref. No.	Part Number	Qty.	Description
1.	215-005	1	Ignition Switch
	215-020		Keys
2.	215-006	1	Push Button Starter Switch
3.	215-138	1	Ammeter (clamp on)
4.	215-254	1	Battery
5.	215-307	2	Battery Cable (20")
Not Shown:			
	215-415		Light Kit (optional)

* Electrical schematic 050-801.

ELECTRICAL DIAGRAM

M422-MCR: WISCONSIN AGND (Electric Start)

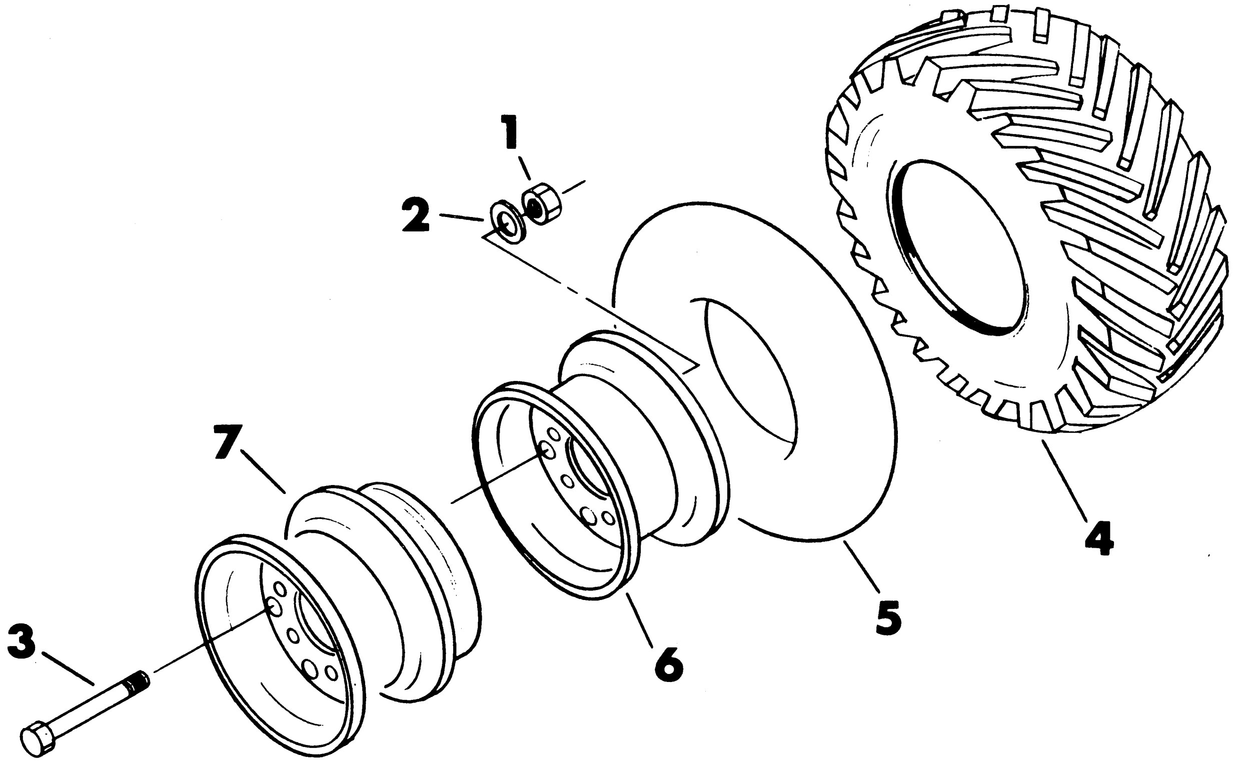


Ref. No.	Part Number	Qty.	Description
1.	195-219	1	Magneto
2.	215-005	1	Ignition Switch
	215-020		Keys
3.	215-006	1	Push Button Starter Switch
4.	215-106	1	Magneto Hour Meter (optional)
	105-189	3	Screw (No. 6-32 x 1/2")
5.	215-101	1	Ammeter (bolt on)
	215-138	1	Ammeter (clamp on)
6.	215-254	1	Battery

Ref. No.	Part Number	Qty.	Description
7.	215-302	1	Battery Cable (30")
	116-193		Terminal Cover
8.	215-307	1	Battery Cable (20")
9.	215-487	1	Wire (16 GA x 10")
10.	215-517	1	Wire (16 GA x 6")—used with hour meter
Not Shown:			
	195-217		Rectifier and Regulator (early model)
	195-419		Stator Alternator (early model)
	215-415		Light Kit (optional)

* Electrical schematic 050-802.

TIRE—TUBE—WHEEL

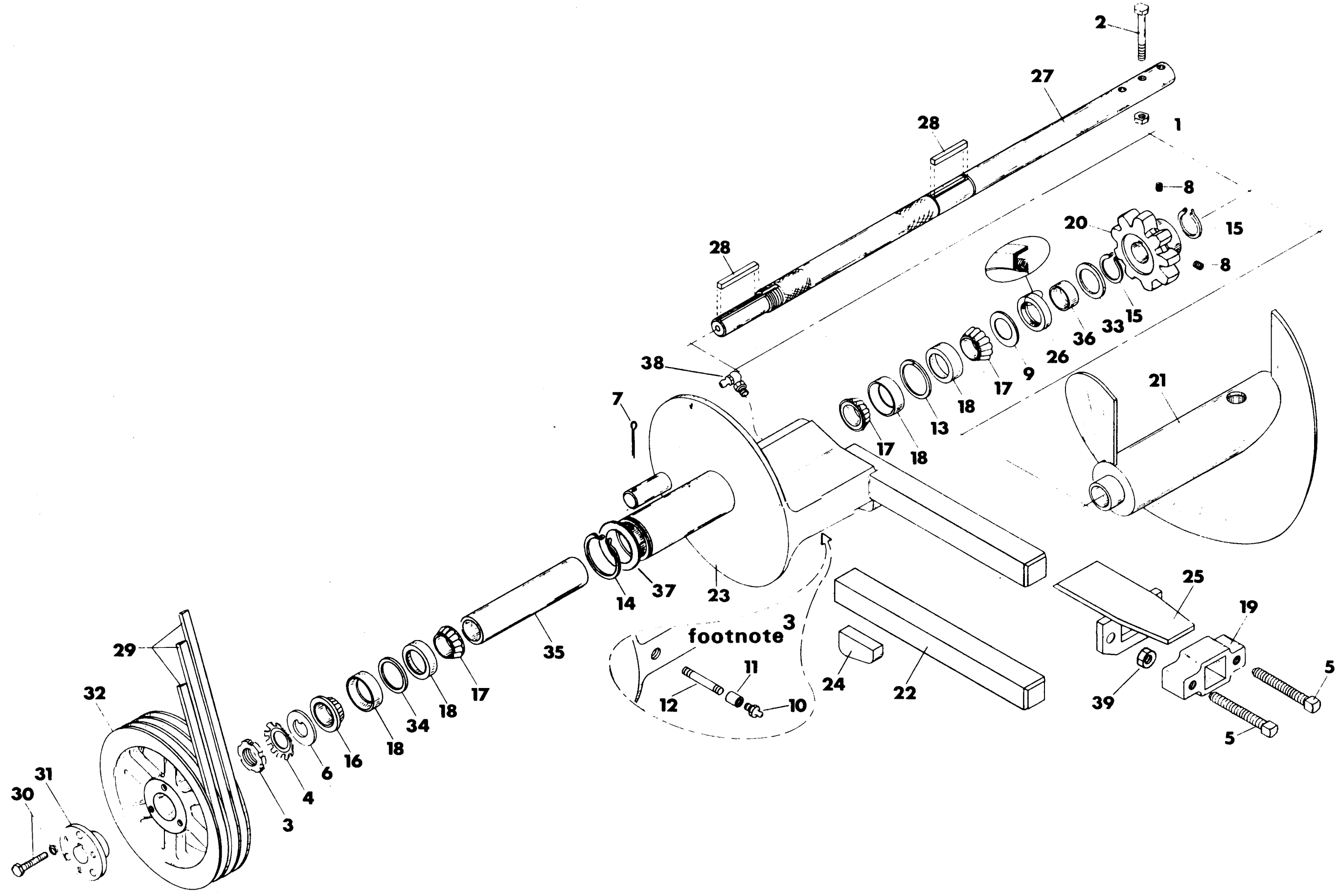


Ref. No.	Part Number	Qty.	Description
1.	105-065		Locknut (1/2-NC)
2.	105-071		Washer (1/2")
3.	105-112		Carriage Bolt (1/2-NC x 8")
4.	205-080		Super Sure Grip Tire (6.00-12, 2-ply)
	205-755		Dual Drive Tire and Wheel (6.00-12, 2-ply)—Incl. ref. no.'s 4, 5 and 7
	205-084		Super Terra Grip Tire (23 x 8.50-12, 2-ply)
5.	205-153		Tube (6.00-12)
	205-159		Tube (8.50-12)
6.	205-207		Wheel (7" WD)—for 8.50-12 tire
	205-210		Wheel (8" WD)—for 6.00-12 tire
7.	205-211		Dual Wheel (5" WD)—for 6.00-12 tires
	N.A.		[1]Dual Drive Wheel Conversion Kit (Incl. dual wheel lock and ref. no.'s 1 thru 5 and 7)
Not Shown:			
	205-165		Valve Cap

[1]Refer to installation diagram 050-920.

NOTE: Refer to general specification 052-195 for recommended tire pressures.

PIVOT

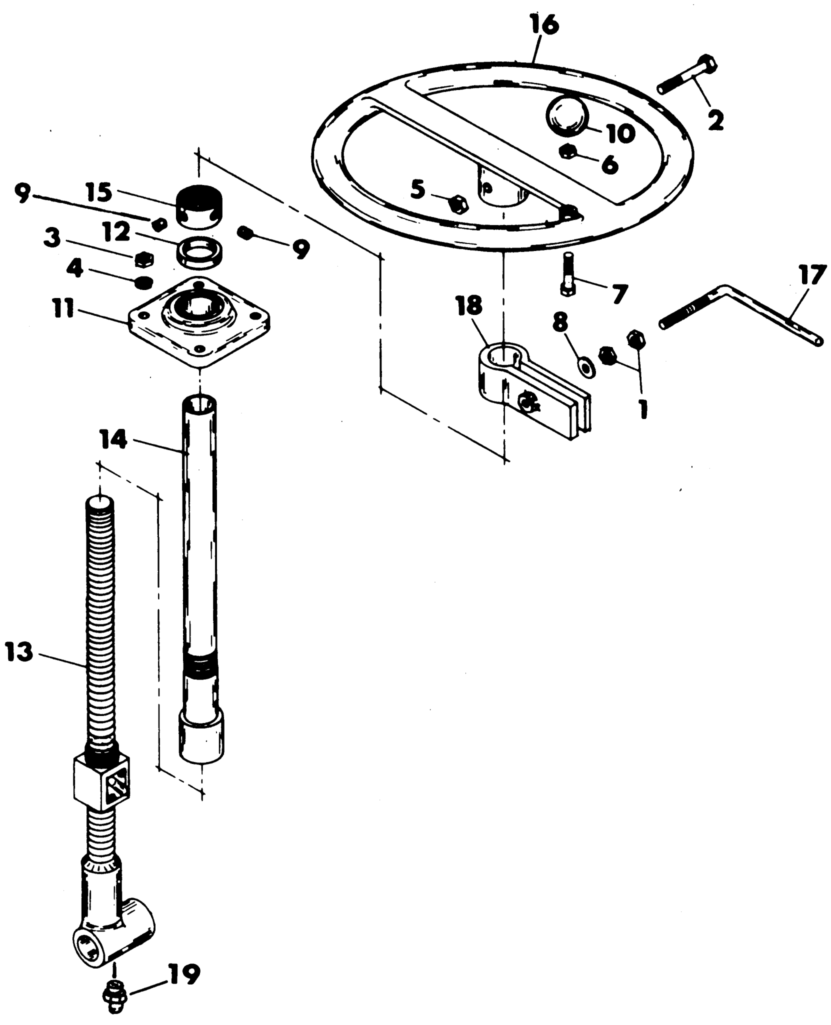


Ref. No.	Part Number	Qty.	Description
1.	105-065	1	Locknut (1/2-NC)
2.	105-067	1	Bolt (1/2-NC x 2-3/4")
3.	105-330	1	[2]Thrust Locknut (1-3/8-NEF)
	105-380	1	[1]Thrust Locknut (1-5/16-NEF)
4.	105-331	1	[2]Tang Lock Washer (1-3/8")
	105-381	1	[1]Thrust Lock Washer (1-5/16")
5.	105-352	2	Screw (3/4-NC x 5", SQ HD)
6.	105-461	1	[2]Tang Washer (1-3/8")
	105-382	1	[1]Tang Washer (1-5/16")
7.	105-502	1	Cotter Pin (3/16" x 2")
8.	105-704	2	Setscrew (5/16-NC x 1/4")
	105-701	2	Setscrew (5/16-NC x 3/8")
9.	110-003	1	Machinery Bushing
10.	115-001	1	[3]Zerk (1/8-NPT, STR)
11.	115-172	1	[3]Pipe Collar (1/8")
12.	115-187	1	[3]Pipe Nipple (1/8" x 5")
13.	115-454	1	Snap Ring (2.72" OD)
14.	115-458	1	Snap Ring (2.775" ID)
15.	115-465	2	Snap Ring (1.272" ID)
16.	125-203	1	Bearing
17.	125-204	3	Bearing
18.	125-205	4	Race
19.	140-038	1	Boom Adjusting Block
20.	140-720	1	Head Shaft Sprocket (9 T, 1-1/4" ID)—used on early style head shaft
	140-702	1	Head Shaft Sprocket (9 T, 1-3/8" ID)
21.	145-047	1	Auger
22.	145-411	1	Pivot Stub
23.	145-423	1	8" Pivot (Incl. ref. no.'s 22 and 24)
	145-418	1	12" Pivot (Incl. ref. no.'s 22 and 24)
	145-414	1	16" Pivot (Incl. ref. no.'s 22 and 24)
24.	145-428	1	Rock Guard
25.	145-479	1	Bearing and Wear Plate
	145-412		Bearing Plate
26.	155-802	1	Seal
27.	165-415	1	Head Shaft (1-3/8" OD)—for 8" pivot
	165-416	1	Head Shaft (1-3/8" OD)—for 12" pivot
	165-417	1	Head Shaft (1-3/8" OD)—for 16" pivot
28.	165-944	2	Key (1/4" SQ x 1-3/4")
29.	170-005	1	Belt Set (3 per set)
30.	170-107	1	Bolt Group (Incl. bolts, washers and setscrew)
31.	170-133	1	Sheave Bushing (Incl. ref. no. 30)
32.	170-193	1	Sheave
33.	180-031	1	Dirt Shield Spacer
34.	180-032	1	Spacer
35.	180-035	1	Spacer (for 8" pivot)
	180-036	1	Spacer (for 12" pivot)
	180-237	1	Spacer (for 16" pivot)
36.	180-037	1	Seal Spacer
37.	110-083	AR	Machinery Bushing
38.	115-002	1	[4]Zerk (1/8-NPT x 90°)
39.	105-310	2	Jam Nut (3/4-NC)

[1] Ends with S/N 120759 for 8" pivot. Ends with S/N 120710 for 12" and 16" pivots.
[2] Begins with S/N 120760 for 8" pivot and S/N 120711 for 12" and 16" pivots.
[3] Used with early style pivots.
[4] Used with later style (and replacement) pivots.

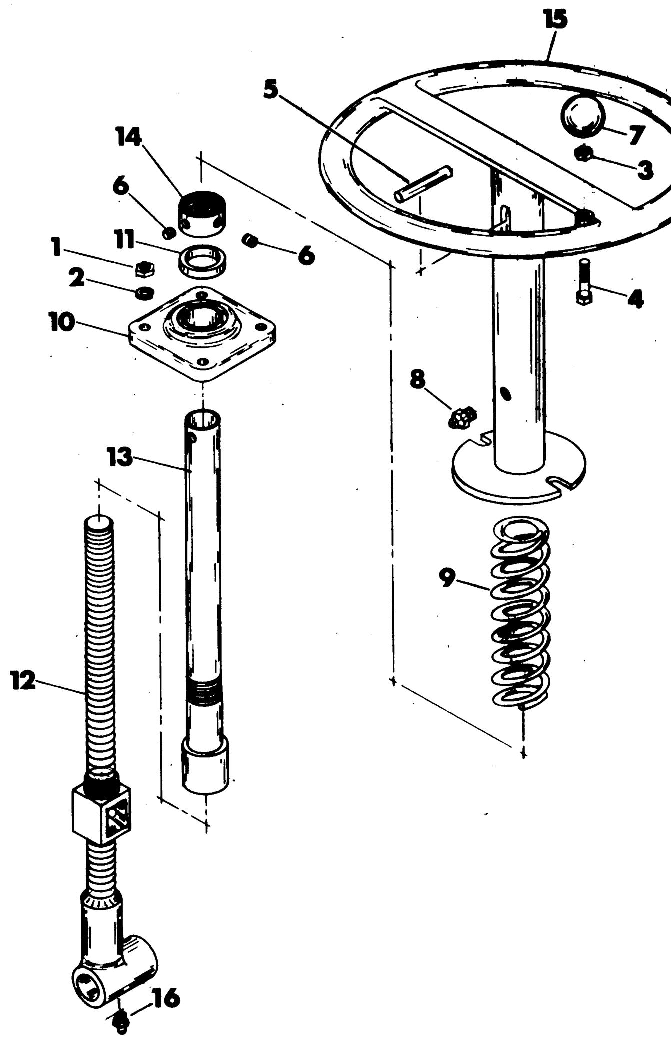
ADJUSTING SCREW

(Parts Only)



Ref. No.	Part Number	Qty.	Description	Ref. No.	Part Number	Qty.	Description
1.	105-021	2	Nut (1/2-NC)	11.	125-601	1	Flange Bearing
2.	105-033	1	Bolt (5/16-NC x 2")		115-003		Zerk (1/4-NF, STR)
3.	105-053	4	Nut (3/8-NC)	12.	180-150	1	Bearing Spacer
4.	105-072	4	Lock Washer (3/8")	13.	190-003	1	Adjusting Screw
5.	105-089	1	Locknut (5/16-NC)	14.	190-004	1	Adapter Tube
6.	105-093	1	Nut (3/8-NF)	15.	190-006	1	Adapter Nut
7.	105-146	1	Bolt (3/8-NF x 2-1/4")	16.	190-014	1	Hand Wheel
8.	105-148	1	Washer	17.	190-021	1	Lock Handle
9.	105-704	2	Setscrew (5/16-NC x 1/4")	18.	190-034	1	Screw Lock
	105-704	2	Setscrew (5/16-NC x 3/8")—replacements	19.	115-001	1	Zerk (1/8-NPT, STR)
10.	110-021	1	Knob				

ADJUSTING SCREW



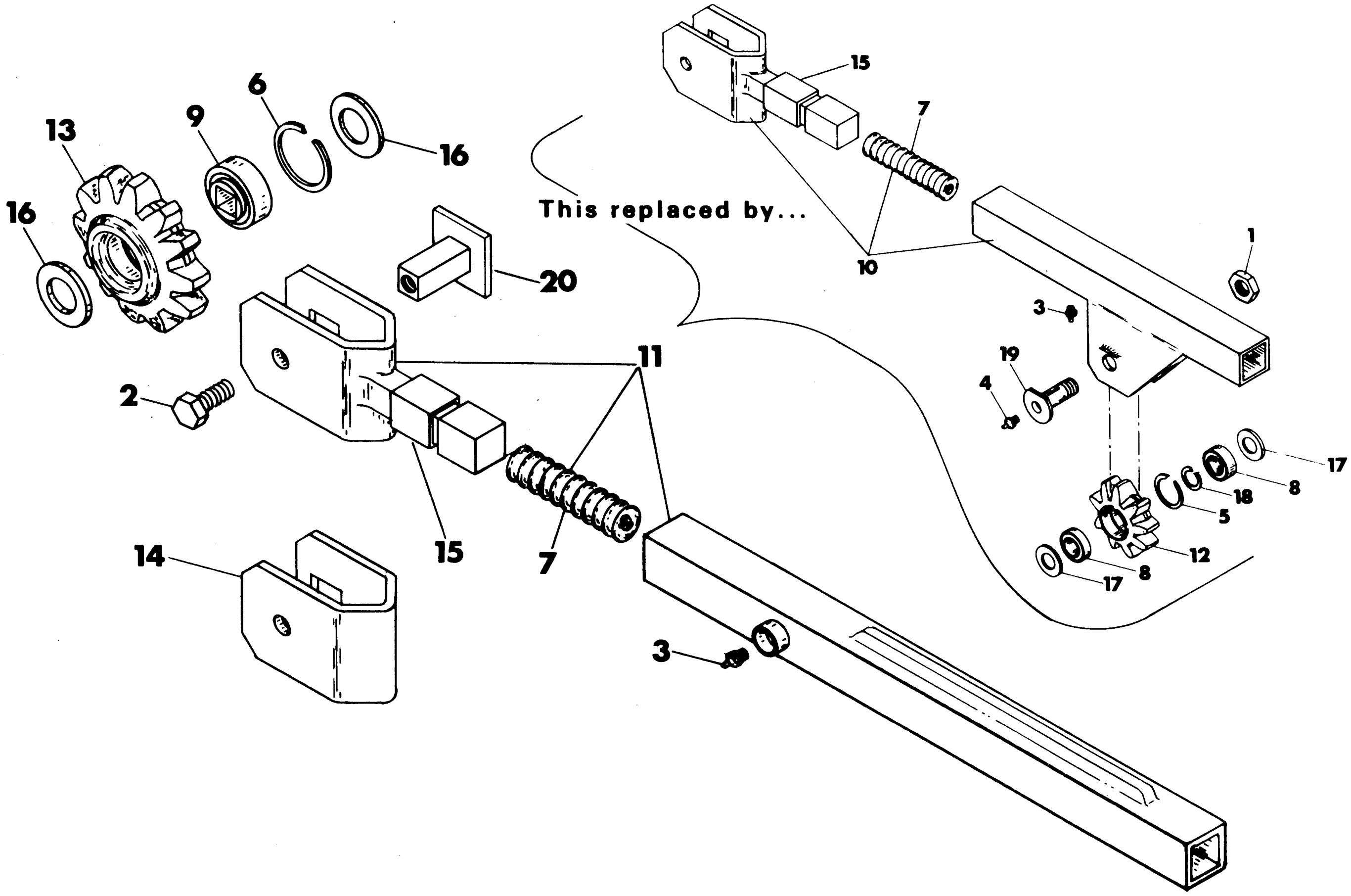
Ref. No.	Part Number	Qty.	Description
	190-254		[1]Spring Lock Adjusting Wheel Kit (Incl. ref. no.'s 5, 8, 9 and 15)
1.	105-053	4	Nut (3/8-NC)
2.	105-072	4	Lock Washer (3/8")
3.	105-093	1	Nut (3/8-NF)
4.	105-146	1	Bolt (3/8-NF x 2-1/4")
5.	105-519	1	Roll Pin (3/8" x 1-1/2")
6.	105-704	2	Setscrew (5/16-NC x 1/4")
	105-701	2	Setscrew (5/16-NC x 3/8")—replacements
7.	110-021	1	Knob
8.	115-003	1	Zerk (1/4-NF, STR)
9.	115-582	1	Spring

Ref. No.	Part Number	Qty.	Description
10.	125-601	1	Flange Bearing
	115-003		Zerk (1/4-NF, STR)
11.	180-150	1	Bearing Spacer
12.	190-003	1	Adjusting Screw
13.	190-004	1	Adapter Tube
14.	190-006	1	Adapter Nut
15.	190-041	1	Hand Wheel
16.	115-001	1	Zerk (1/8-NPT, STR)
	115-013	1	Zerk (1/4-NF, STR)

[1] Refer to installation diagram 050-994.

BOOM

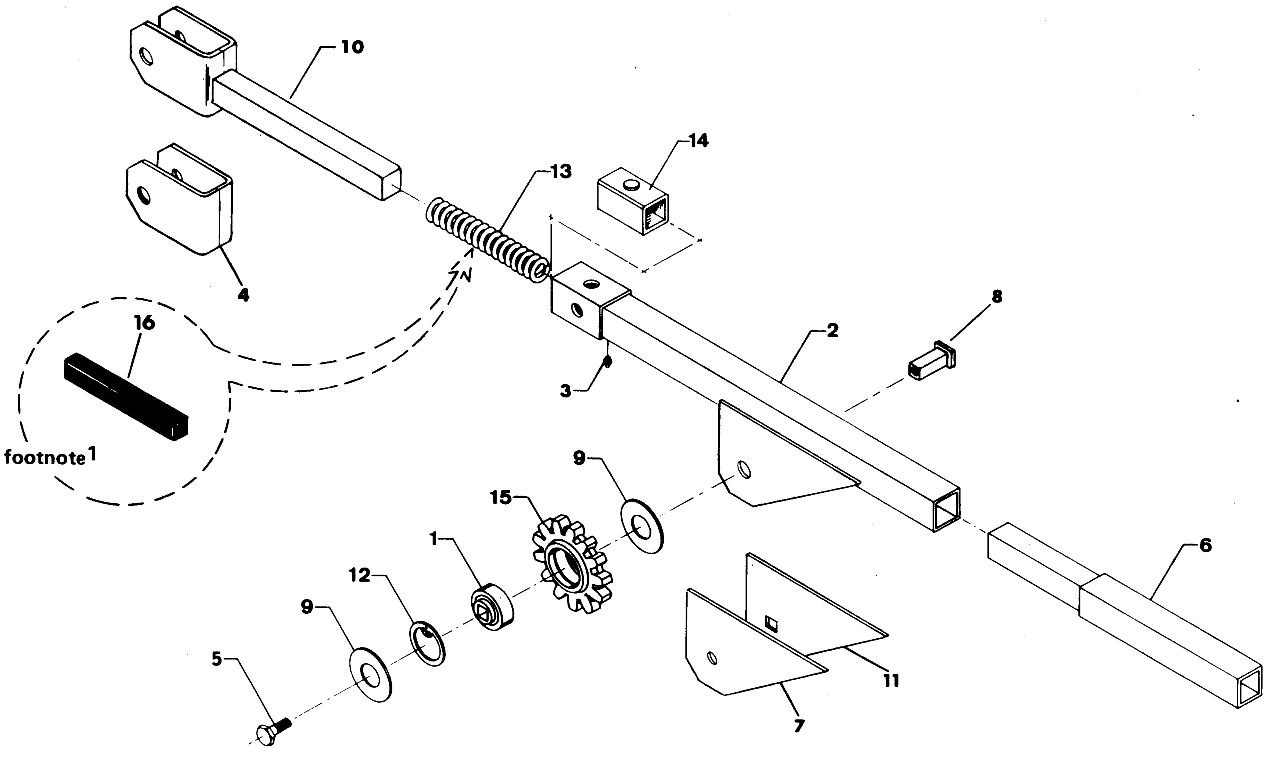
(Parts Only)



Ref. No.	Part Number	Qty.	Description
1.	105-378	1	Jam Nut (1-NF)
2.	105-379	1	Bolt (3/4-NC x 1-1/4", Nylok)
3.	115-001	1	Zerk (1/8-NPT, STR)
4.	115-003	1	Zerk (1/4-NF, STR)
5.	115-459	1	Internal Snap Ring
6.	115-464	1	Internal Snap Ring
7.	115-553	1	Compression Spring
8.	125-007	2	Bearing
9.	125-009	1	Bearing
10.	140-031		[1]Boom
11.	140-050	1	Boom (Incl. ref. no.'s 7 and 15)
	140-063		Boom Parts Assembly (Incl. ref. no.'s 2, 3, 6, 9, 13, 16 and 20)
12.	140-710	1	Idler Sprocket (9 T)
	140-651		Idler Sprocket Parts Assembly (Incl. ref. no.'s 5, 8, 17 and 18)
13.	140-712	1	Idler Sprocket (12 T)
	140-653		Idler Sprocket Parts Assembly (Incl. ref. no.'s 6, 9 and 16)
14.	140-762		Slide and Stop Sprocket Side Plate
15.	140-770	1	Slide and Stop
16.	140-775	2	Dirt Shield Flat Washer
17.	155-816	2	Dirt Shield
18.	180-213	1	Bearing Spacer
19.	180-443	1	Idler Shaft
20.	180-445	1	Idler Shaft

[1] This boom is no longer available and has been replaced by boom (ref. no. 11).

BOOM



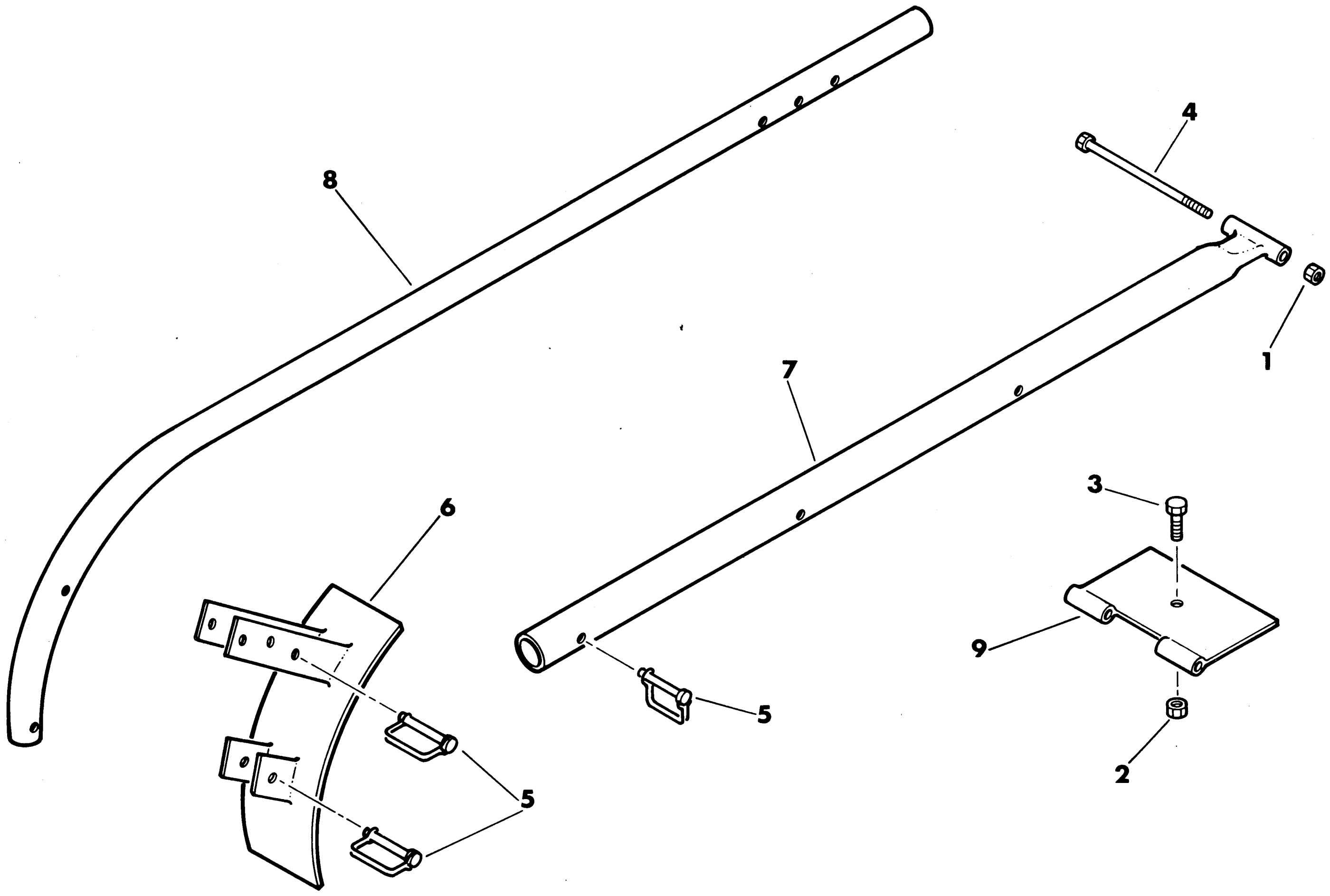
Ref. No.	Part Number	Qty.	Description
	140-060		Boom Parts Assembly (31-1/2" LG)—Incl. ref. no.'s 1, 2, 5, 8, 9, 10 and 12 thru 15
1.	125-009	2	Bearing
2.	140-051	1	Boom (31-1/2" LG)—Incl. ref. no.'s 7 and 11
3.	115-002	1	[2]Zerk (1/8-NPT x 90°)
4.	140-762	1	Slide and Stop Sprocket Side Plate
5.	105-379	2	Bolt (3/4-NC x 1-1/4", Nylok)
6.	140-551	1	1' Boom Extension
	140-552	1	2' Boom Extension
7.	140-054		Idler Sprocket Gusset (RD hole)
	140-055		[3]Gusset Spacer
8.	180-445	2	Idler Shaft
9.	140-775	4	Dirt Shield Washer
10.	140-759	1	Slide and Stop
11.	140-053		Idler Sprocket Gusset (SQ hole)
	140-055		[3]Gusset Spacer
12.	115-464	2	Internal Snap Ring (3.296" OD)
13.	115-554	1	Compression Spring (8" LG)
14.	140-027		Boom Sleeve Socket (weld-on)
	140-028		Urethane Boom Sleeve
15.	140-712	2	Idler Sprocket (12 T)
	140-653		Idler Sprocket Parts Assembly (Incl. ref. no.'s 1, 9 and 12)
16.	140-516		[1]Urethane Spring

[1] Urethane spring (ref. no. 16) may be used to replace compression spring (ref. no. 13).

[2] Zerk is not required with urethane boom sleeve.

[3] Used to space SQ and RD hole gussets (ref. no.'s 7 and 11).

TRENCH CLEANER



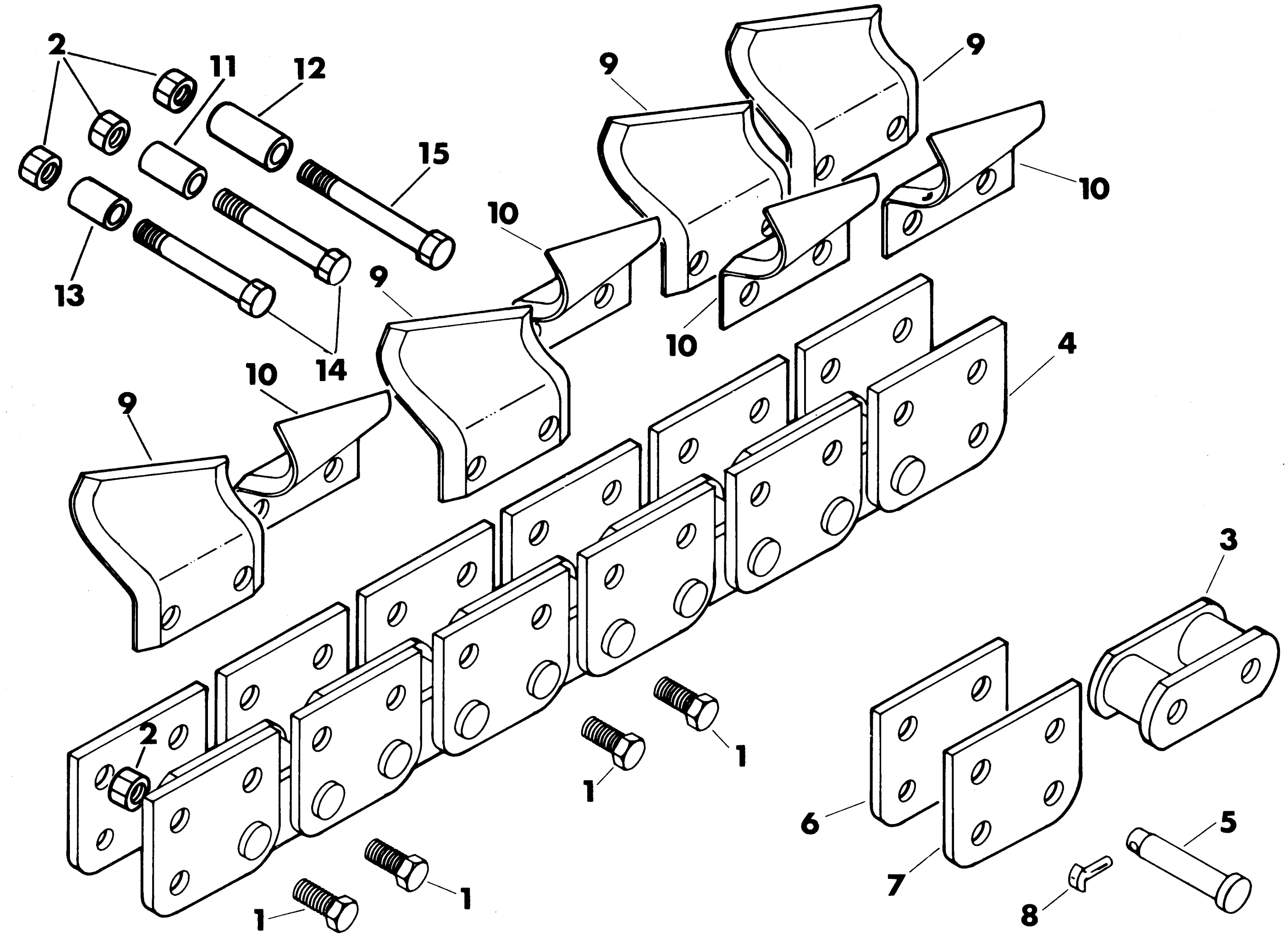
Ref. No.	Part Number	Qty.	Description
	100-101		[1]Mechanical Cleaner Kit (Incl. ref. no.'s 1 thru 5 and 7 thru 9)
1.	105-047	1	Locknut (3/8-NC)
2.	105-065	1	Locknut (1/2-NC)
3.	105-121	1	Bolt (1/2-NC x 1")
4.	105-169	1	Bolt (3/8-NC x 7-1/2")
5.	110-032	3	Clip Pin

Ref. No.	Part Number	Qty.	Description
6.	140-816	1	4" Trench Cleaner Shoe
	140-817	1	6" Trench Cleaner Shoe
	140-818	1	8" Trench Cleaner Shoe
	140-823	1	10" Trench Cleaner Shoe
	140-819	1	12" Trench Cleaner Shoe
	140-814	1	16" Trench Cleaner Shoe
7.	140-820	1	Straight Trench Cleaner Bar
8.	140-821	1	Curved Trench Cleaner Bar
9.	140-822	1	Trench Cleaner Mounting Plate

[1]Refer to installation diagram 050-061.

DIGGING CHAIN (28,000 LB TEST)

1.654" PITCH CHAIN—2 PITCH SPACING

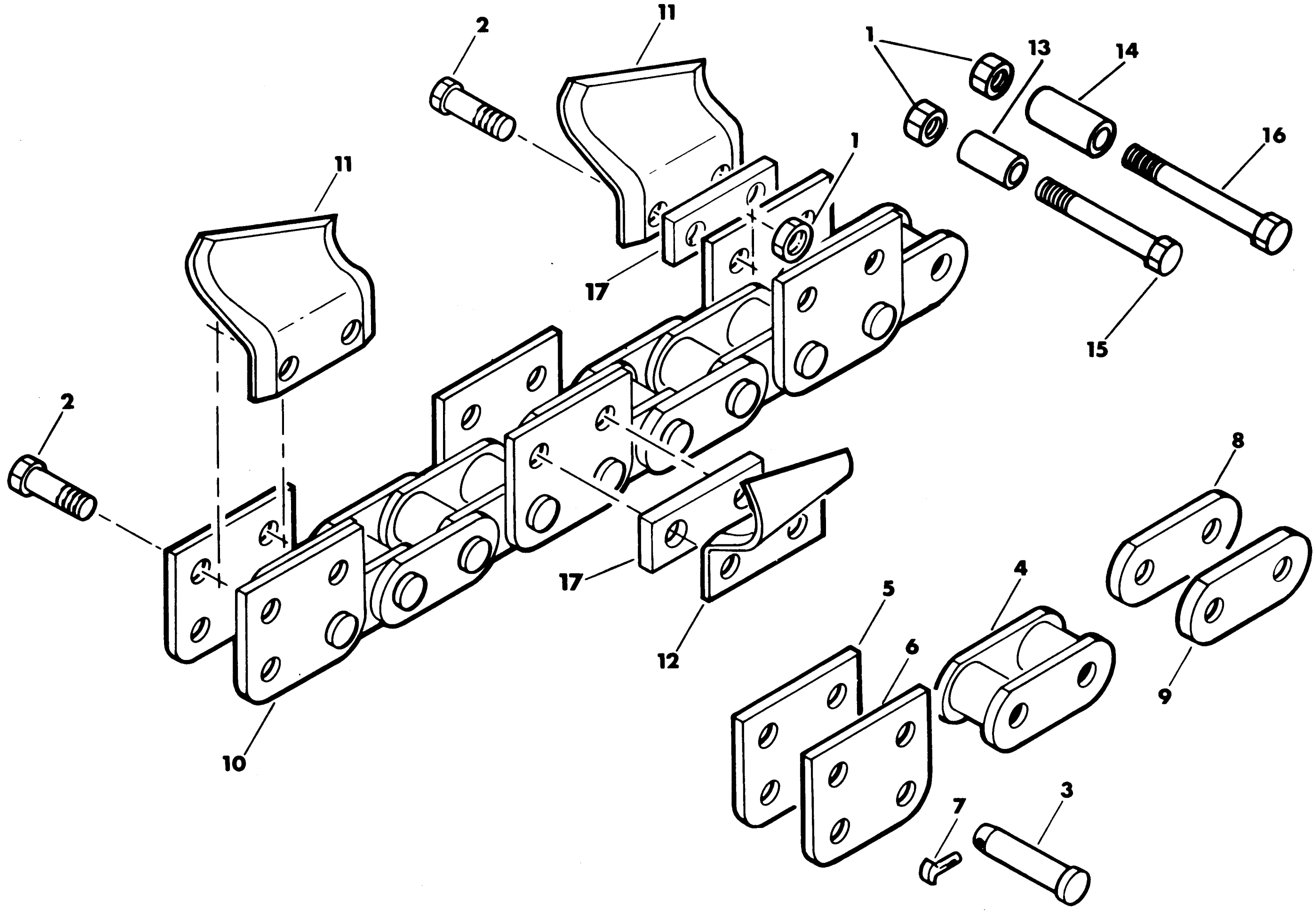


Ref. No.	Part Number	Qty.	Description
1.	105-099	AR	Bolt (3/8-NC x 7/8")
2.	105-047	AR	Locknut (3/8-NC)
3.	135-003	AR	Roller Link
4.	135-014	AR	2'-2" Digging Chain (less teeth)
	135-015	AR	7'-2" Digging Chain (less teeth)
5.	135-001	AR	Chain Pin
6.	135-005	AR	Tooth Sidebar (key side)
7.	135-006	AR	Tooth Sidebar (head side)
8.	135-007	AR	Lock Key
9.	135-931	AR	Right Digging Tooth
10.	135-932	AR	Left Digging Tooth
11.	181-651	AR	[1]Chain Spacer (used with one tooth inside)
12.	181-650	AR	[1]Chain Spacer (used with one or two teeth outside)
13.	181-652	AR	[1]Chain Spacer (used with two teeth inside)
14.	105-162	AR	Bolt (3/8-NC x 2-1/4")—used with chain spacer and one tooth inside
15.	105-183	AR	Bolt (3/8-NC x 2-1/2")—used with chain spacer and one tooth outside
	500-003	AR	Bolt (3/8-NC x 2-3/4")—used with chain spacer and two teeth outside

[1] Chain spacers are optional for dealer installation.

DIGGING CHAIN (28,000 LB TEST)

1.654" PITCH CHAIN—4 PITCH SPACING



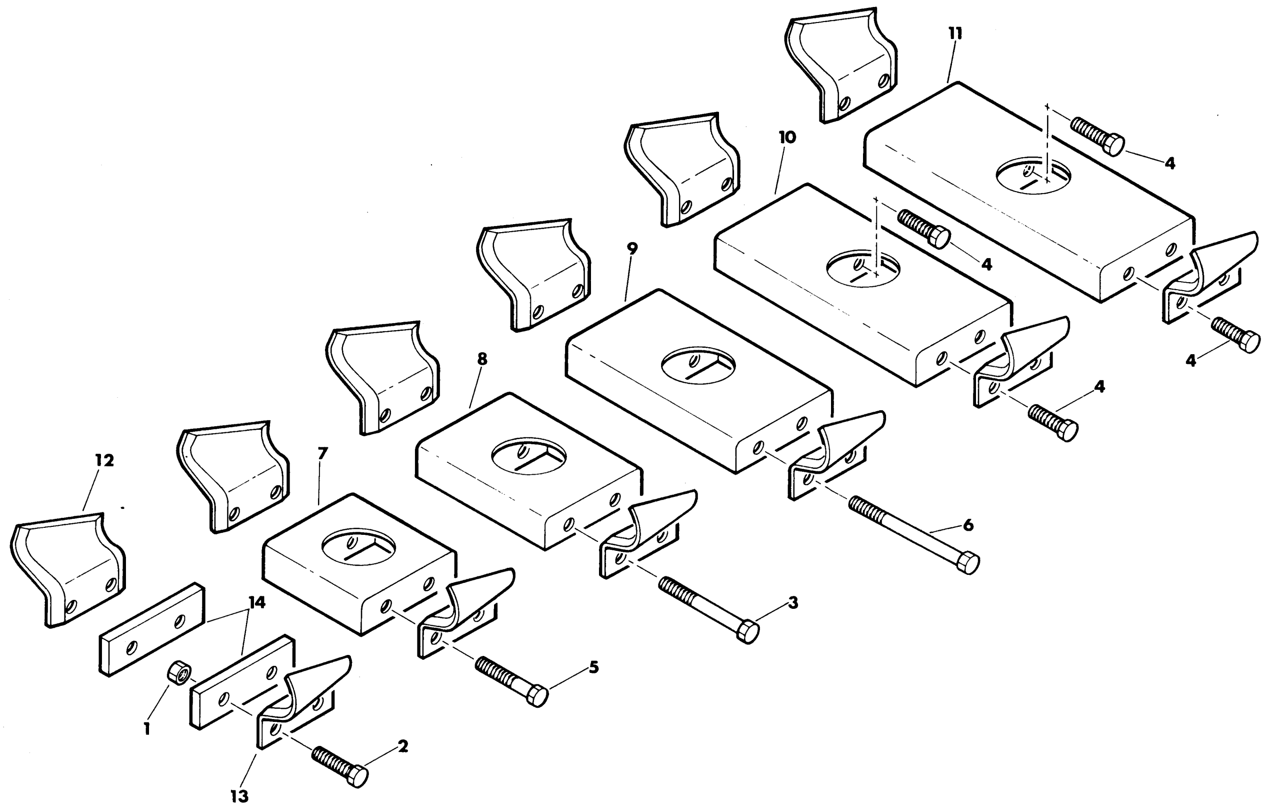
Ref. No.	Part Number	Qty.	Description
1.	105-047	AR	Locknut (3/8-NC)
2.	105-099	AR	Bolt (3/8-NC x 7/8")
3.	135-001	AR	Chain Pin
4.	135-003	AR	Roller Link
5.	135-005	AR	Tooth Sidebar (key side)
6.	135-006	AR	Tooth Sidebar (head side)
7.	135-007	AR	Lock Key
8.	135-008	AR	Plain Sidebar (key side)
9.	135-009	AR	Plain Sidebar (head side)
10.	135-010	AR	2'-2" Digging Chain (less teeth)
	135-011	AR	7'-2" Digging Chain (less teeth)
11.	135-931	AR	Right Digging Tooth (1-1/4" width)
12.	135-932	AR	Left Digging Tooth (1-1/4" width)
13.	181-651	AR	[1]Chain Spacer (used with one tooth inside)
14.	181-650	AR	[1]Chain Spacer (used with one tooth outside)
15.	105-162	AR	Bolt (3/8-NC x 2-1/4")—used with chain spacer and one tooth inside
16.	105-183	AR	Bolt (3/8-NC x 2-1/2")—used with chain spacer and one tooth outside
17.	135-936	AR	Tooth Spacer (3/8" x 1")

[1]Chain spacers are optional for dealer installation.

DIGGING CHAIN ADAPTERS (28,000 LB TEST)

1.654" PITCH CHAIN

(For 1-7/8" width teeth)



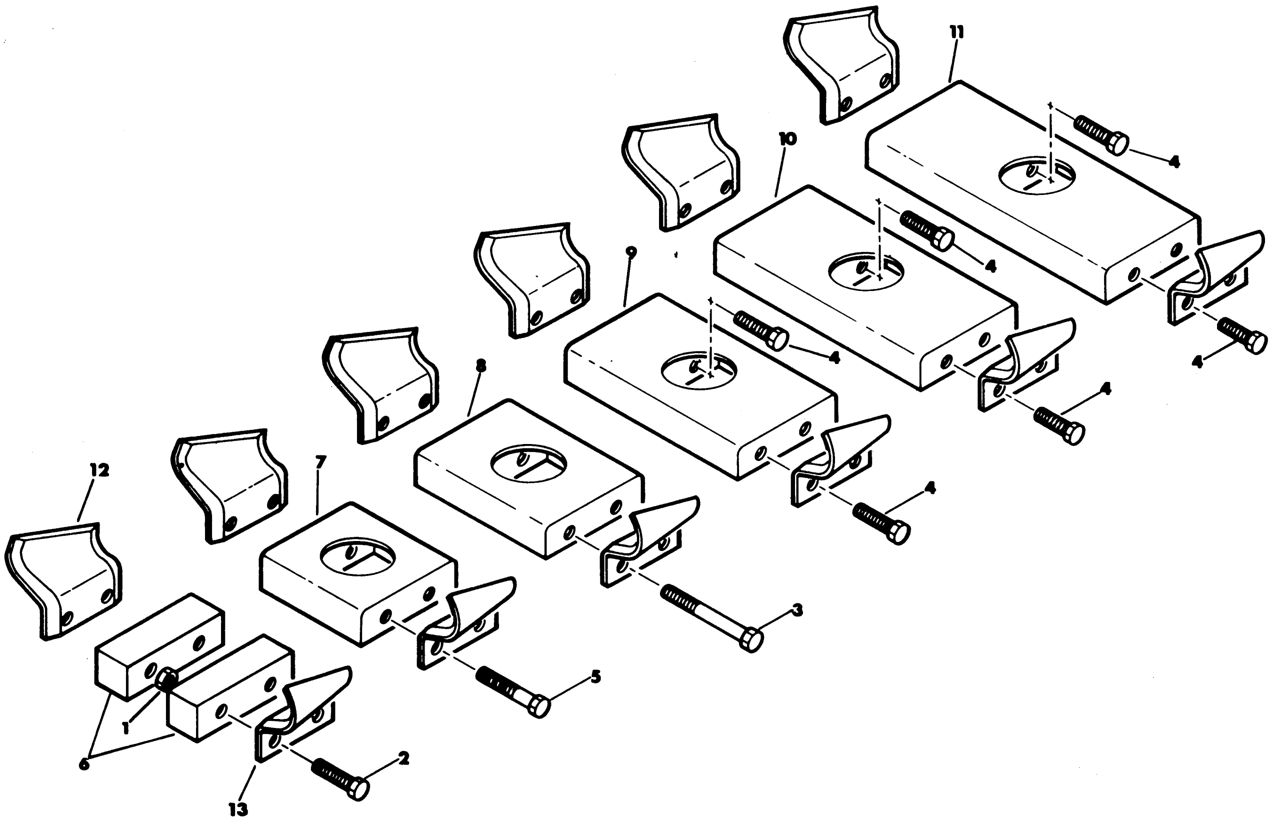
Ref. No.	Part Number	Qty.	Description
1.	105-047	AR	Locknut (3/8-NC)
2.	105-052	AR	Bolt (3/8-NC x 1-1/4")
3.	105-081	AR	Bolt (3/8-NC x 3-1/4")
4.	105-099	AR	Bolt (3/8-NC x 7/8")
5.	105-162	AR	Bolt (3/8-NC x 2-1/4")
6.	105-207	AR	Bolt (3/8-NC x 4-1/4")
7.	N.A.	AR	[1]Adapter (4-1/2" LG)—for 8" width
8.	N.A.	AR	[1]Adapter (6-1/2" LG)—for 10" width
9.	N.A.	AR	[1]Adapter (8-1/2" LG)—for 12" width
10.	N.A.	AR	[1]Adapter (10-1/2" LG)—for 14" width
11.	N.A.	AR	[1]Adapter (12-1/2" LG)—for 16" width
12.	N.A.	AR	[1]Right Digging Tooth (1-7/8" width)
13.	N.A.	AR	[1]Left Digging Tooth (1-7/8" width)
14.	135-936	AR	[1]Tooth Spacer (3/8" x 1")—for 6" width

[1] Teeth (1-7/8" width) and adapters designed for them are no longer available. Mixing of old teeth or adapters with new teeth or adapters results in deviations from standard digging widths. For replacement teeth and adapters see page entitled DIGGING CHAIN ADAPTERS (28,000 LB TEST — 1.654" PITCH CHAIN — (For 1-1/4" width teeth)

DIGGING CHAIN ADAPTERS (28,000 LB TEST)

1.654" PITCH CHAIN

(For 1-1/4" width teeth)

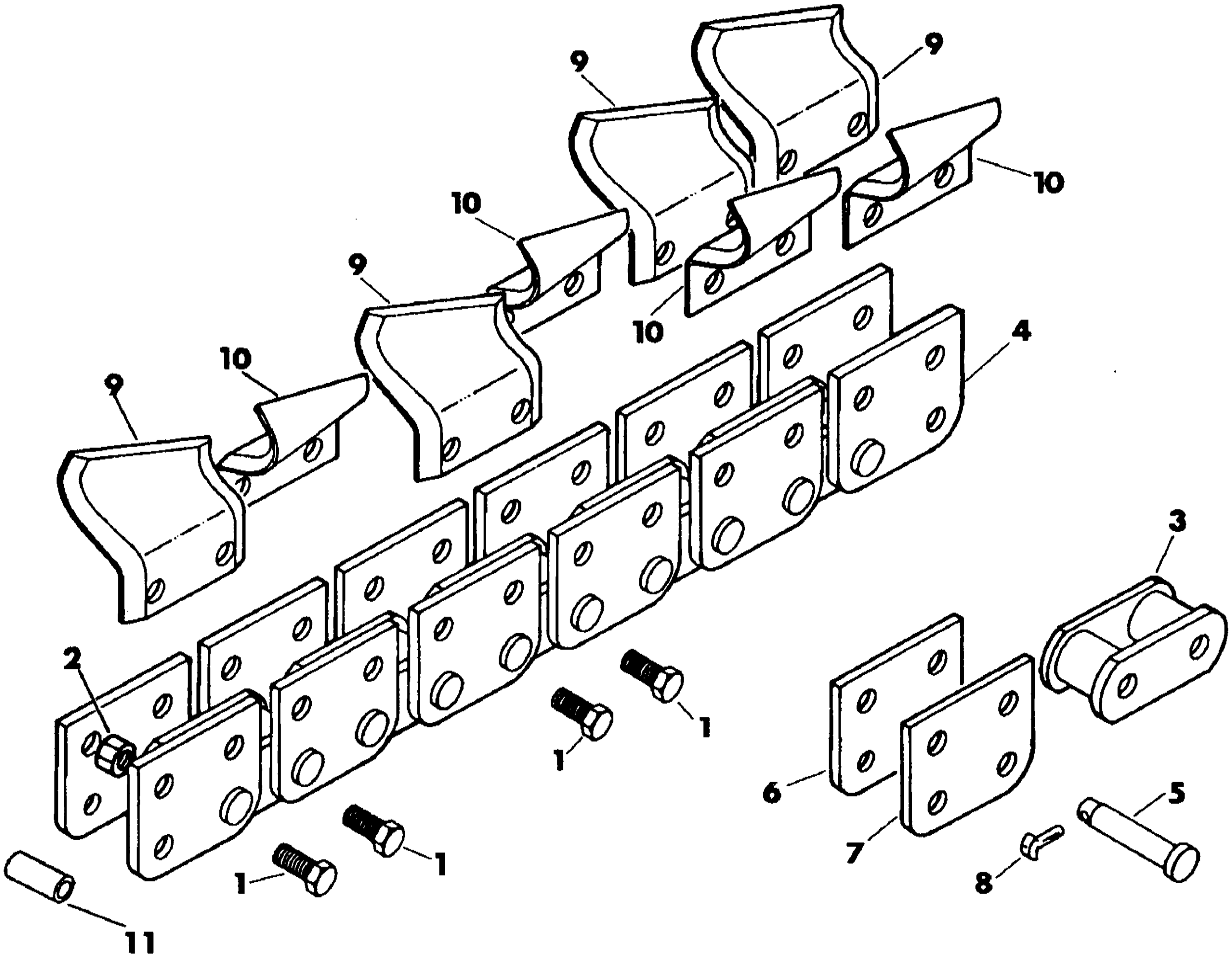


Ref. No.	Part Number	Qty.	Description
1.	105-047	AR	Locknut (3/8-NC)
2.	105-075	AR	Bolt (3/8-NC x 2")
3.	105-258	AR	Bolt (3/8-NC x 3-3/4")
4.	105-099	AR	Bolt (3/8-NC x 7/8")
5.	500-003	AR	Bolt (3/8-NC x 2-3/4")
6.	135-963	AR	[1]Tooth Adapter Spacer (1" SQ)—for 6" width
7.	135-916	AR	[1]Tooth Adapter (5-1/2" LG)—for 8" width
8.	135-917	AR	[1]Tooth Adapter (7-1/2" LG)—for 10" width
9.	135-918	AR	[1]Tooth Adapter (9-1/2" LG)—for 12" width
10.	135-919	AR	[1]Tooth Adapter (11-1/2" LG)—for 14" width
11.	135-920	AR	[1]Tooth Adapter (13-1/2" LG)—for 16" width
12.	135-931	AR	[1]Right Digging Tooth (1-1/4" width)
13.	135-932	AR	[1]Left Digging Tooth (1-1/4" width)

[1] When using teeth (1-1/4" width) and adapters designed for them with earlier style teeth (1-7/8" width) and adapters, variances from normal stated trenching widths may occur.

DIGGING CHAIN (33,000 LB TEST)

1.654" PITCH CHAIN—2 PITCH SPACING

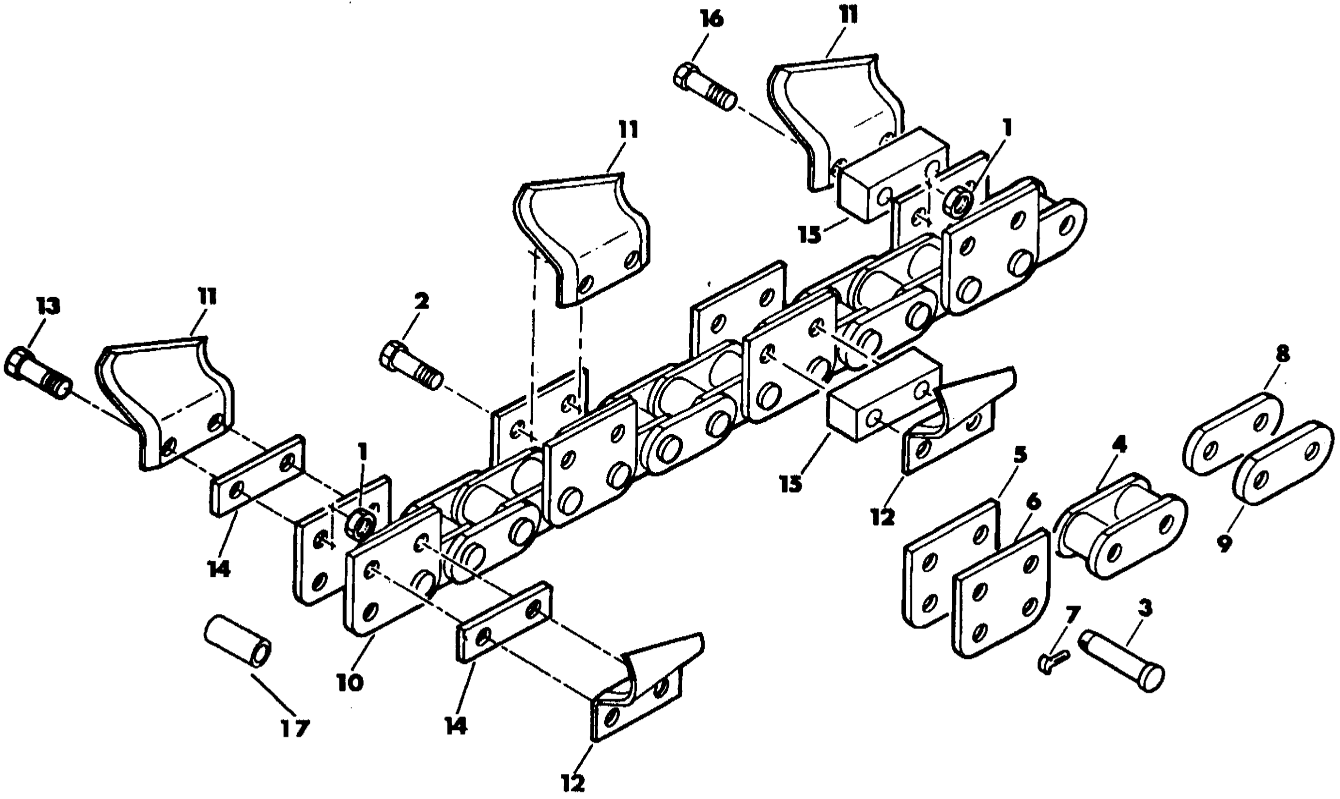


Ref. No.	Part Number	Qty.	Description
1.	105-099	AR	Bolt (3/8-NC x 7/8")
2.	105-047	AR	Locknut (3/8-NC)
3.	137-003	AR	Roller Link
4.	137-014	AR	2'-2" Digging Chain (less teeth)
	137-015	AR	7'-2" Digging Chain (less teeth)
5.	135-001	AR	Chain Pin
6.	137-005	AR	[1]Tooth Sidebar (key side)
7.	137-006	AR	[1]Tooth Sidebar (head side)
8.	135-007	AR	Lock Key
9.	136-024	AR	[1]Right Digging Tooth
10.	136-025	AR	[1]Left Digging Tooth
11.	181-650	AR	[2] Chain Spacer (1.41" LG)used with outside teeth
	181-651	AR	[2]Chain Spacer (1.235" LG)used with one inside tooth
	181-652	AR	[2]Chain Spacer (1.045" LG)used with two inside teeth

[1] These parts have 1.8" bolt hole spacing.

[2] Chain spacers (ref. no. 11) are used on lead bolts.

DIGGING CHAIN (33,000 LB TEST)
1.654" PITCH CHAIN—4 PITCH SPACING

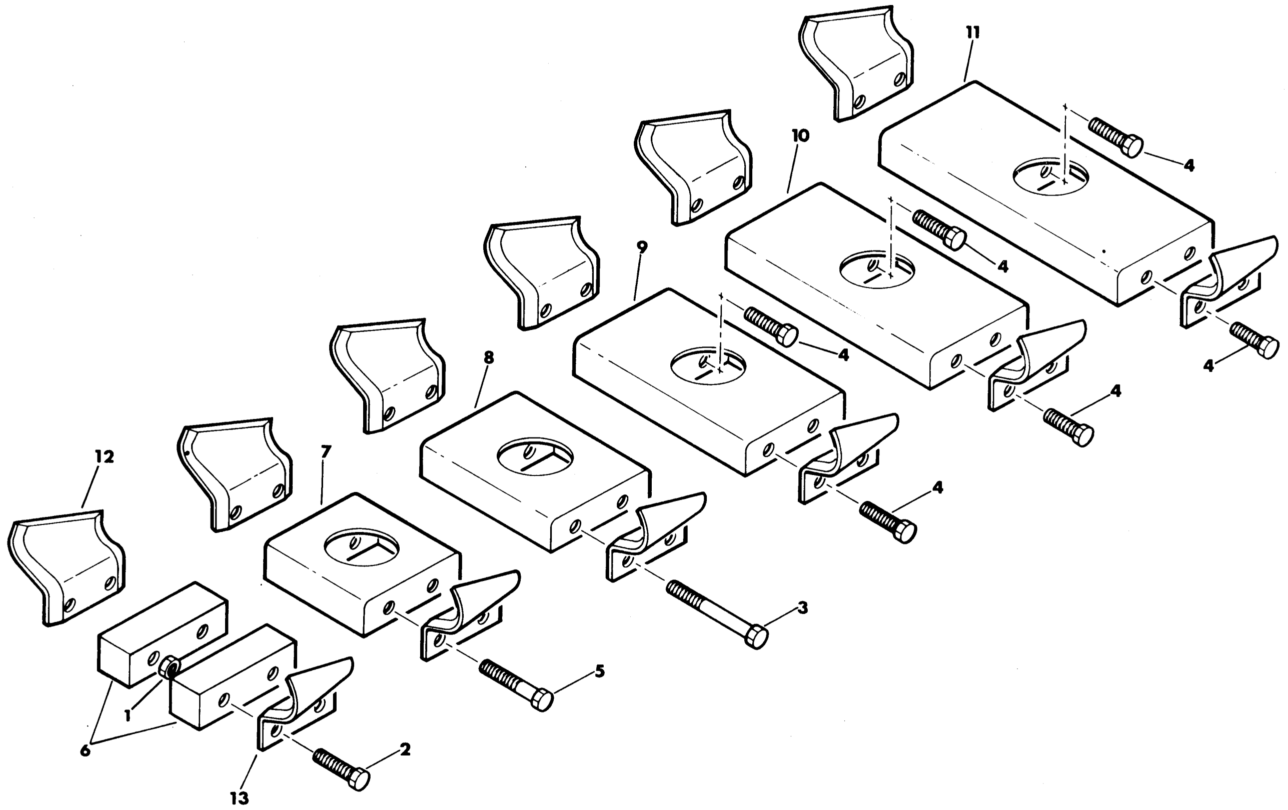


Ref. No.	Part Number	Qty.	Description
1.	105-047	AR	Locknut (3/8-NC)
2.	105-099	AR	Bolt (3/8-NC x 7/8")
3.	135-001	AR	Chain Pin
4.	137-003	AR	Roller Link
5.	137-005	AR	Tooth Sidebar (key side)
6.	137-006	AR	Tooth Sidebar (head side)
7.	135-007	AR	Lock Key
8.	137-008	AR	Plain Sidebar (key side)
9.	137-009	AR	Plain Sidebar (head side)
10.	137-010	AR	2'-2" Digging Chain (less teeth)
	137-011	AR	7'-2" Digging Chain (less teeth)
11.	136-024	AR	Right Digging Tooth
12.	136-025	AR	Left Digging Tooth
13.	105-052	AR	Bolt (3/8-NC x 1-1/4")
14.	136-028	AR	[1]Tooth Spacer (3/8" x 1")
15.	136-029	AR	[1]Tooth Adapter Spacer (1" SQ)
16.	105-075	AR	Bolt (3/8-NC x 2")
17.	181-650	AR	[2]Chain Spacer (1.41" LG)—used with outside teeth
	181-651	AR	[2]Chain Spacer (1.235" LG)—used with one inside tooth
	181-652	AR	[2]Chain Spacer (1.045" LG)—used with two inside teeth

[1] These parts have 1.8" bolt hole spacing.

[2] Chain spacers (ref. no. 17) are used on lead bolts.

DIGGING CHAIN ADAPTERS (33,000 LB TEST)
1.654" PITCH CHAIN

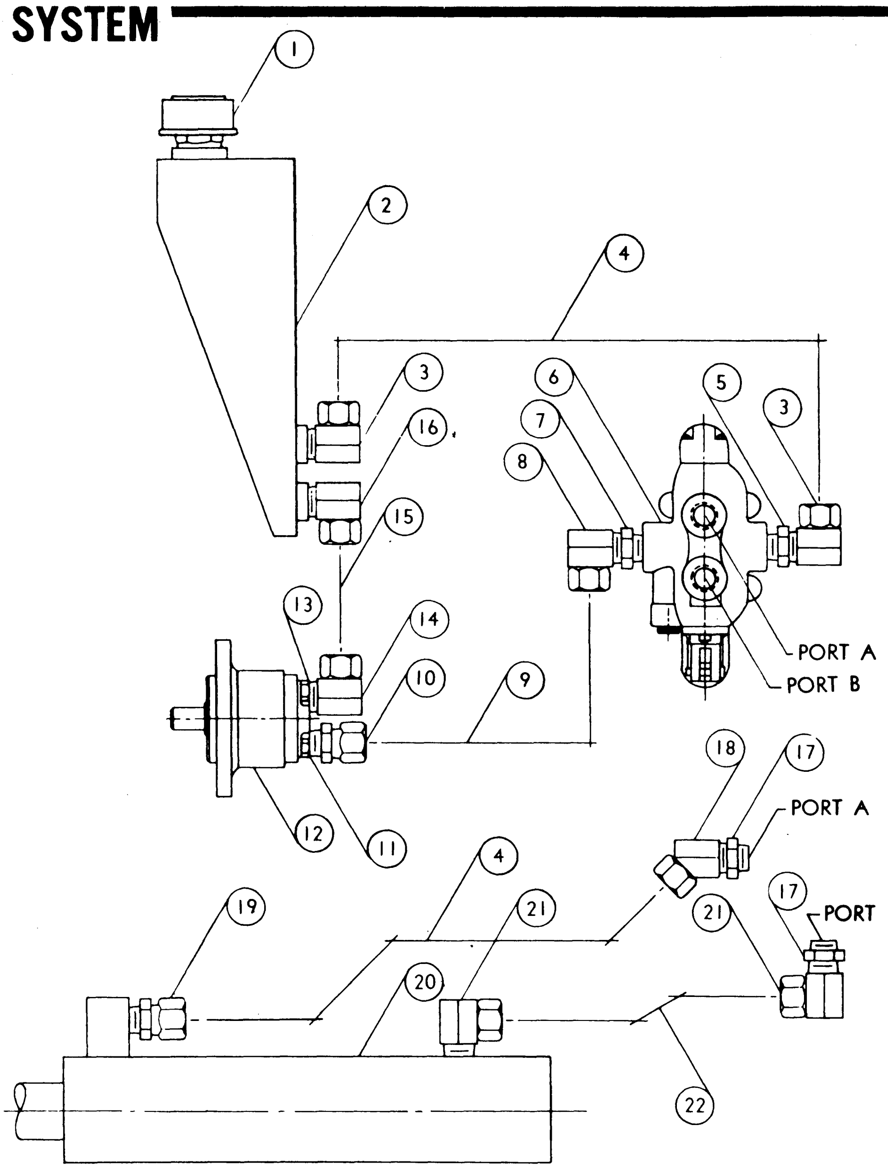


Ref. No.	Part Number	Qty.	Description
1.	105-047	AR	Locknut (3/8-NC)
2.	105-075	AR	Bolt (3/8-NC x 2")
3.	105-258	AR	Bolt (3/8-NC x 3-3/4")
4.	105-099	AR	Bolt (3/8-NC x 7/8")
5.	500-003	AR	Bolt (3/8-NC x 2-3/4")
6.	136-029	AR	[1]Tooth Adapter Spacer (1" SQ)—for 6" width
7.	136-047	AR	[1]Tooth Adapter (5-1/2" LG)—for 8" width
8.	136-048	AR	[1]Tooth Adapter (7-1/2" LG)—for 10" width
9.	136-049	AR	[1]Tooth Adapter (9-1/2" LG)—for 12" width
10.	136-050	AR	[1]Tooth Adapter (11-1/2" LG)—for 14" width
11.	136-051	AR	[1]Tooth Adapter (13-1/2" LG)—for 16" width
12.	136-024	AR	[1]Right Digging Tooth (1-1/4" width)
13.	136-025	AR	[1]Left Digging Tooth (1-1/4" width)

[1] These parts have 1.8" bolt hole spacing.

HYDRAULIC SYSTEM

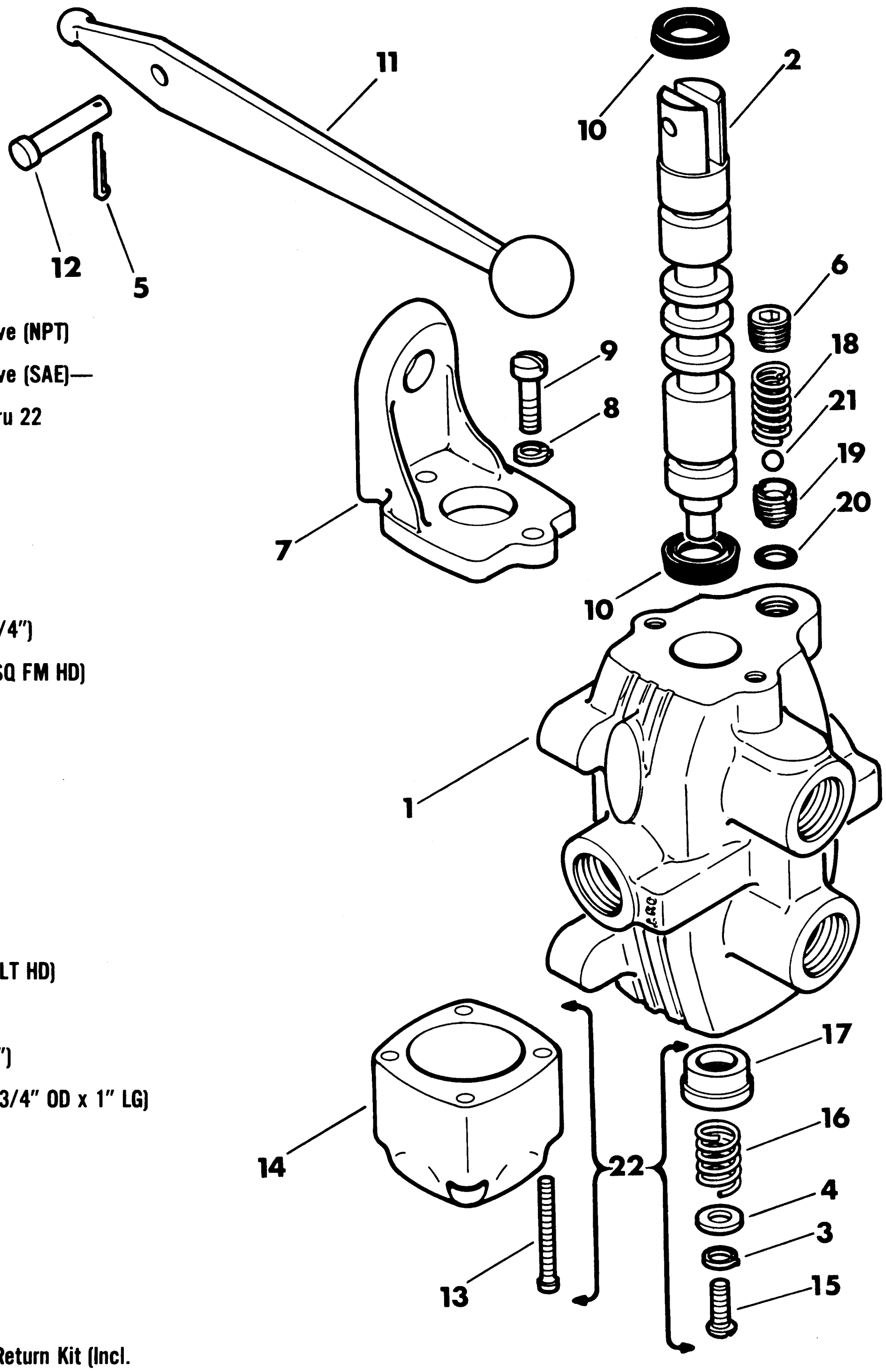
(Parts Only)



Ref. No.	Part Number	Qty.	Description
1.	500-137	1	Breather Cap
2.	N.A.	1	Hydraulic Reservoir
3.	155-025	2	[2]Adapter Union (1/2-NPT x 1/4-NPT x 90°)
4.	155-323	2	Hose (1/4" x 18", 2750 PSI)
5.	115-126	1	[2]Pipe Bushing (1/2-NPT x 3/4-NPT)
6.	155-605	1	[1]Hydraulic Control Valve (NPT)
	155-621	1	Hydraulic Control Valve (SAE)
7.	115-219	1	[2]Pipe Bushing (3/8-NPT x 3/4-NPT)
8.	155-029	1	[2]Adapter Union (3/8-NPT x 1/4-NPT x 90°)
9.	155-324	1	Hose (1/4" x 20", 2750 PSI)
10.	155-026	1	Adapter Union (9/16-SAE x 1/4-NPT, STR)— Incl. ref. no. 11
11.	155-705		O-Ring (-906)
12.	155-502	1	Hydraulic Pump
13.	155-706		O-Ring (-908)
14.	155-024	1	Adapter Union (3/4-SAE x 3/8-NPT x 90°)— Incl. ref. no. 13
15.	155-338	1	Hose (3/8" x 13", 2250 PSI)
16.	155-031	1	Adapter Union (1/2-NPT x 3/8-NPT x 90°)
17.	115-135	2	[2]Pipe Bushing (1/4-NPT x 1/2-NPT)
18.	155-002	1	[2]Adapter Union (1/4-NPT x 1/4-NPT x 45°)
19.	155-041	1	Adapter Union (1/4-NPT x 1/4-NPT, STR, w/orifice)
20.	150-024	1	Pivot Cylinder
	190-110		Seal Repair Kit
21.	155-001	2	[2]Adapter Union (1/4-NPT x 1/4-NPT x 90°)
22.	155-322	1	Hose (1/4" x 12", 2750 PSI)
23.	110-130	1	Magnet

[1] Replacement valves will require fittings with SAE threads.
[2] These parts are used with hydraulic control valves which have pipe threads.

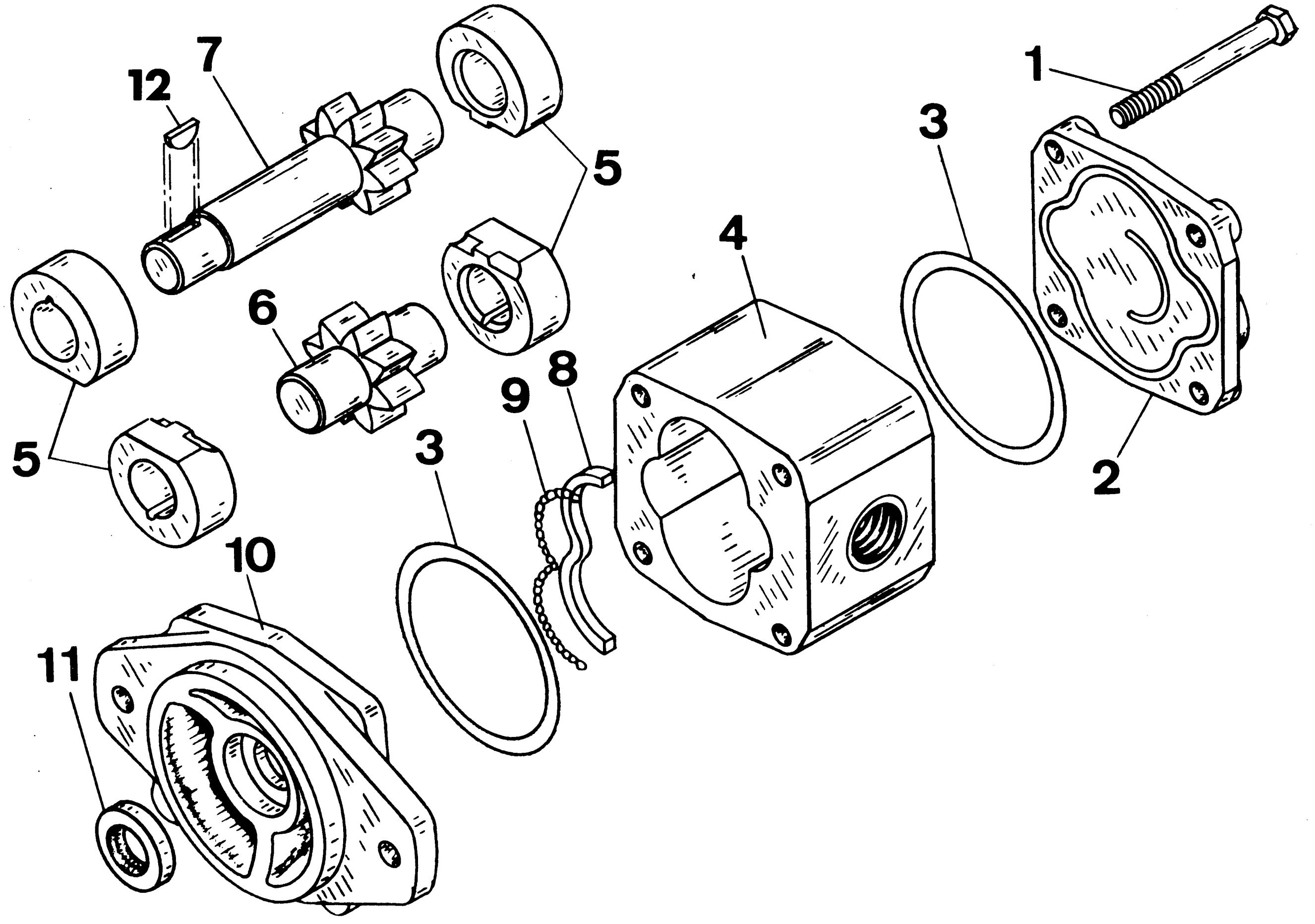
HYDRAULIC CONTROL VALVE



Ref. No.	Part Number	Qty.	Description
	155-605		[1]Hydraulic Control Valve (NPT)
	155-621		[1]Hydraulic Control Valve (SAE)— Incl. ref. no.'s 1 thru 22
1.	N.A.	1	Housing
2.	N.A.	1	Valve Spool
3.	105-079	1	Lock Washer (1/4")
4.	105-226	1	Washer
5.	105-512	1	Cotter Pin (3/32" x 3/4")
6.	115-178	1	Pipe Plug (3/8-NPT, SQ FM HD)
7.	500-054	1	Lever Bracket
8.	500-055	2	Lock Washer (1/4")
9.	500-056	2	Bolt
10.	500-057	2	U-Cup Seal
11.	500-058	1	Lever
12.	500-059	1	Lever Pin
13.	500-060	4	[2]Bolt (5/32-NC x 1", SLT HD)
14.	500-061	1	[2]Detent Bonnet
15.	501-179	1	Screw (1/4-NC x 1/2")
16.	500-065	1	[2]Compression Spring (3/4" OD x 1" LG)
17.	500-066	1	[2]Spool Collar
18.	500-182	1	[3]Compression Spring
19.	500-184	1	[3]Relief Valve Seat
20.	500-185	1	[3]O-Ring (-110)
21.	500-186	1	[3]Relief Valve Ball
22.	500-374	1	[2]Light Spring Neutral Return Kit (Incl. ref. no.'s 3, 4 and 13 thru 17)

[1] Replacement control valves require SAE fittings.
[2] Refer to neutral return installation diagram 050-088. Order new return kit if parts requiring replacement are not available separately.
[3] Refer to pressure relief replacement diagram 052-141.

HYDRAULIC PUMP



Ref. No.	Part Number	Qty.	Description
	155-502		Hydraulic Pump
1.	500-003	4	[2]Bolt (3/8-NC x 2-3/4")
2.	500-001	1	Rear Cover
3.	500-007	2	Gasket
4.	500-008	1	[1]Body
5.	500-011	4	[1]Bearing
6.	500-012	1	[1]Driven Gear
7.	500-015	1	[1]Drive Gear

Ref. No.	Part Number	Qty.	Description
8.	500-020	1	Seal Gasket
9.	500-021	1	Spacer
10.	500-022	1	Front Cover
11.	155-878	1	Internal Seal
12.	165-938	1	Woodruff Key (5/32" x 5/8")

[1] If this part requires replacement, it is recommended that complete pump assembly be replaced.

[2] Bolt (ref. no. 1) should be torqued to 28-32 FT LBS.

MISCELLANEOUS
M—M2—M3

Ref. No.	Part Number	Qty.	Description
BELT CLUTCH			
	170-303	1	Belt Idler Roller (2-3/8" LG)—for the M and M2
	170-305	1	Belt Idler Roller (2-7/8" LG)—for the M3
FRAME PARTS			
	180-361	1	Dual Trail Wheel Axle (1" ID)—for M3
	N.A.	1	Trail Wheel Assembly (for M3)
PIVOT			
	140-705	1	Head Shaft Sprocket (1" ID)—for the M, M2 and M3
	140-718	1	Head Shaft Sprocket (1-1/8" ID)—for the M3
	140-720	1	Head Shaft Sprocket (1-1/4" ID)—for the M3
	145-018	1	Auger (1-3/16" ID)—for the M and M2
	170-001	1	Belt Set (66" CIR, 2/set)— for M and M2
	170-165	1	Head Shaft Sheave (2 groove)—for M and M2
	170-223	1	Head Shaft Sheave Bushing (1" ID)—for M and M2
	170-164	1	Bolt Group
ADJUSTING SCREW			
	125-602	1	Flange Bearing (1" ID)—for M3
	125-706		Lock Collar
	105-712		Setscrew (1/4-NC x 1/4")
	190-023	1	Adjusting Screw Hand Wheel (for M3)
	190-033	1	Adjusting Screw Lock (for M3)

Ref. No.	Part Number	Qty.	Description
ENGINE			
	170-102	1	Engine Sheave (2 groove, 1" ID)—for M and M2
	175-006	1	Engine Sprocket (1" ID)—for M and M2
DRIVE TRAIN			
	125-509	1	Axle Pillow Block Bearing (1-1/4" ID)—for M, M2 and M3
	105-702		Setscrew (3/8-NC x 3/8")
	125-704		Lock Collar
	105-704		Setscrew (1/4-NC x 1/4")
	105-701		Setscrew (1/4-NC x 3/8")—replacements
	130-003	1	Reducer Roller Chain (No. 40, 99 P)—for M and M2
	160-828	1	Wheel Clutch Hub (1-1/4" ID)—for M3
	Components of Clutch Hub		
	105-132	5	Bolt (7/16-NC x 1-1/2")
	115-575	1	Compression Spring
	160-829	1	Drive Wheel Hub (1-1/4" ID)—for M, M2 and M3
	Components of Drive Wheel Hub		
	105-132	5	Bolt (7/16-NC x 1-1/2")

PRODUCT SUPPORT

SERIAL NUMBER RECORD

Record the serial numbers and date of purchase of your trencher and engine in the space provided here. Specify part number and machine serial number to expedite processing of parts orders. The serial number for the M is located on the model plate mounted on the front left of the deck.

Date of purchase: ______________________

Machine serial number: ______________________

Engine serial number: ______________________

PRODUCT SUPPORT PROCEDURE

Notify your dealer immediately of any malfunction or failure of Ditch Witch equipment.

Always give model, serial number and approximate date of your equipment purchase. This information should be recorded and placed on file by the owner at the time of purchase.

Return damaged parts to dealer for inspection and product support consideration.

Order genuine Ditch Witch replacement or repair parts from your authorized Ditch Witch dealer. Use of another manufacturer's parts will void product support consideration.

Ditch Witch® New Replacement Parts Product Support Policy

Schedule A

All new replacement parts manufactured by The Charles Machine Works, Inc. carry a 90 day Product Support Policy to provide free replacement parts should a part contain a defect in material or workmanship.

This Product Support Policy is limited to parts returned to the Dealer and determined defective on inspection by The Charles Machine Works, Inc. It does not include transportation charges or freight. This Product Support Policy does not cover parts damaged by abuse or neglect. This Product Support Policy does not cover parts improperly installed, or consequential damage due to replacement part being defective in material or workmanship.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THIS DESCRIPTION. SPECIFICALLY EXCLUDED ARE THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND THE WARRANTY OF MERCHANTABILITY.

The engine and engine accessories are covered by the original manufacturer's warranty and are not covered by the Ditch Witch New Replacement Parts Product Support Policy.

All models of Ditch Witch equipment have been field tested for satisfactorily performance in various conditions. This testing does not guarantee that the equipment will perform satisfactorily in all conditions or situations. Adequacy of the unit should be determined by operating it under the anticipated soil and field conditions prior to purchase.

A Note To Ditch Witch Equipment Owners:

If your equipment was purchased through a Ditch Witch dealer, there is no need to read further.

However, if you purchased from any other source, please fill out the form on the reverse side and return it to us.

This will enable you to receive updates on this equipment as well as information on new products of interest.

Thanks for using Ditch Witch equipment!

(Please Fold Along This Line And Seal At Bottom With Tape)

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Purchaser's Company Name

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Street Address or P.O. Box

City County

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Phone Number With Area Code

Machine Model Serial Number

Attachments Serial Number

Attachments Serial Number

Attachments Serial Number

Name of Ditch Witch Dealership

Your Signature

Thanks!

The Charles Machine Works, Inc.
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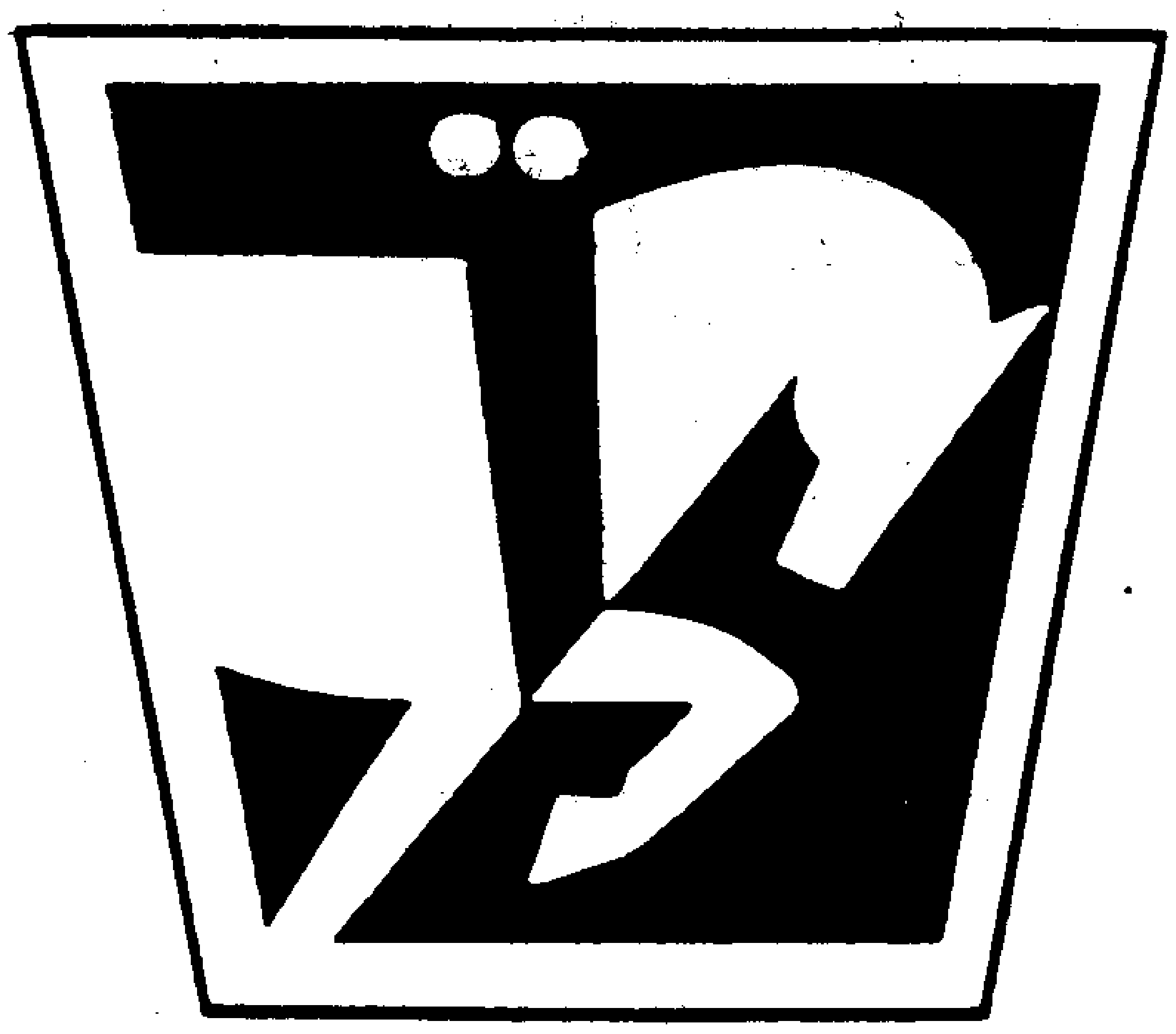
TRENCHER



WISCONSIN ENGINES

INSTRUCTION BOOK AND PARTS LIST

Model AGND

IMPORTANT

READ THESE INSTRUCTIONS CAREFULLY

All points of operation and maintenance have been covered as carefully as possible but if further information is required, inquiries sent to the factory will receive prompt attention.

When writing the factory ALWAYS GIVE THE MODEL, SPECIFICATION AND SERIAL NUMBER of engine referred to.

STARTING AND OPERATING OF NEW ENGINES

Careful breaking-in of a new engine will greatly increase its life and result in trouble-free operation. A factory test is not sufficient to establish the polished bearing surfaces, which are so necessary to the proper performance and long life of an engine. Neither is there a quick way to force the establishment of good bearing surfaces. These can only be obtained by running a new engine carefully and under reduced speeds and loads for a short time, as follows:

First, be sure the engine is filled to the proper level with a good quality of engine oil, see "Grade of Oil" chart.

Before a new engine is put to its regular work, the engine should be operated at low idle speed (1000 to 1200 R.P.M.) for one half hour, without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional two hours.

If at all possible, operate the engine at light loads, for a period totaling about eight hours, before maximum load is applied. This will greatly increase engine life.

The various bearing surfaces in a new engine have not been glazed, as they will be with continued operation, and it is in this period of "running in," that special care must be exercised, otherwise the highly desired glaze will never be obtained. A new bearing surface that has once been damaged by carelessness will be ruined forever.

Our engine warranty is printed on the inside back cover of this manual. Read it carefully.

For Your Own Record

THIS MANUAL IS FOR MY WISCONSIN MODEL .... ENGINE

SPEC. No. .... SERIAL No. ....

THE ABOVE INFORMATION, WHICH WILL BE FOUND ON THE INSTRUCTION PLATE ATTACHED TO THE AIR SHROUD OF THE ENGINE, SHOULD BE FILLED IN. YOUR PROMPT ATTENTION TO THIS MATTER WILL MAKE IT CONVENIENT FOR YOU IN THE FUTURE, AS THIS INFORMATION MUST BE GIVEN WHEN ORDERING ENGINE REPAIR PARTS.

BOOK OF INSTRUCTIONS

WISCONSIN *Air-Cooled*
Single Cylinder Engine

READ THE *STARTING AND OPERATING INSTRUCTIONS* THOROUGHLY BEFORE STARTING A NEW ENGINE. BECOME ACQUAINTED WITH THE ENGINE COMPONENTS; THEIR LOCATION, MAINTENANCE AND ADJUSTMENT REQUIREMENTS.

FLYWHEEL ALTERNATOR instructions and parts list are located in the rear section of this manual.

3-1/2" Bore – 4" Stroke
38.5 cu. in. Displacement

Model AGND

ISSUE MM-271-F

INTRODUCTION

This manual has been compiled to suit the service requirements of the basic engine and accessories most commonly supplied with the engine.

Teledyne Wisconsin adapts its engines to suit individual customer requirements whenever practical. However, it would become too involved to include all variations in one manual; therefore, should any problems arise concerning engine servicing, we advise that a Teledyne Total Power Distributor or authorized Service Center be contacted, as they are capable of identifying all parts by the specification number stamped on the name plate of engine.

WISCONSIN heavy duty air cooled engines are of the most advanced design and are built in a modern factory, equipped with the latest machinery available. Only the best materials, most suitable for the particular part, are used. During production, every part is subjected to the most rigid inspection, as are also the completely assembled engines. After assembly, every engine is operated on its own power for several hours. All adjustments are carefully made so that each engine will be in perfect operating condition when it leaves the factory.

Teledyne Wisconsin Motor is backed by over seventy years of engineering experience in the design of internal-combustion engines for every conceivable type of service. The performance of these engines is proof of the long satisfactory service you too can expect from your engine.

Like all fine machinery, the engine must be given regular care and be operated in accordance with the instructions.

SAFETY PRECAUTIONS

- Never fill fuel tank while engine is running or hot; avoid the possibility of spilled fuel causing a fire.
- Always refuel slowly to avoid spillage.
- When starting engine, maintain a safe distance from moving parts of equipment.
- Do not start engine with clutch engaged.
- Do not spin hand crank when starting. Keep cranking components clean and free from conditions which might cause the crank jaw to bind and not release properly. Oil periodically to prevent rust.
- Never run engine with governor disconnected, or operate at speeds in excess of 3200 R.P.M. load.
- Do not operate engine in a closed building unless the exhaust is piped outside. This exhaust contains carbon monoxide, a poisonous, odorless and invisible gas, which if breathed causes serious illness and possible death.
- Never make adjustments on machinery while it is connected to the engine, without first removing the ignition cable from the spark plug. Turning the machinery over by hand during adjusting or cleaning might start the engine and machinery with it, causing serious injury to the operator.
- Precaution is the best insurance against accidents.

Keep this book handy at all times, familiarize yourself with the operating instructions.

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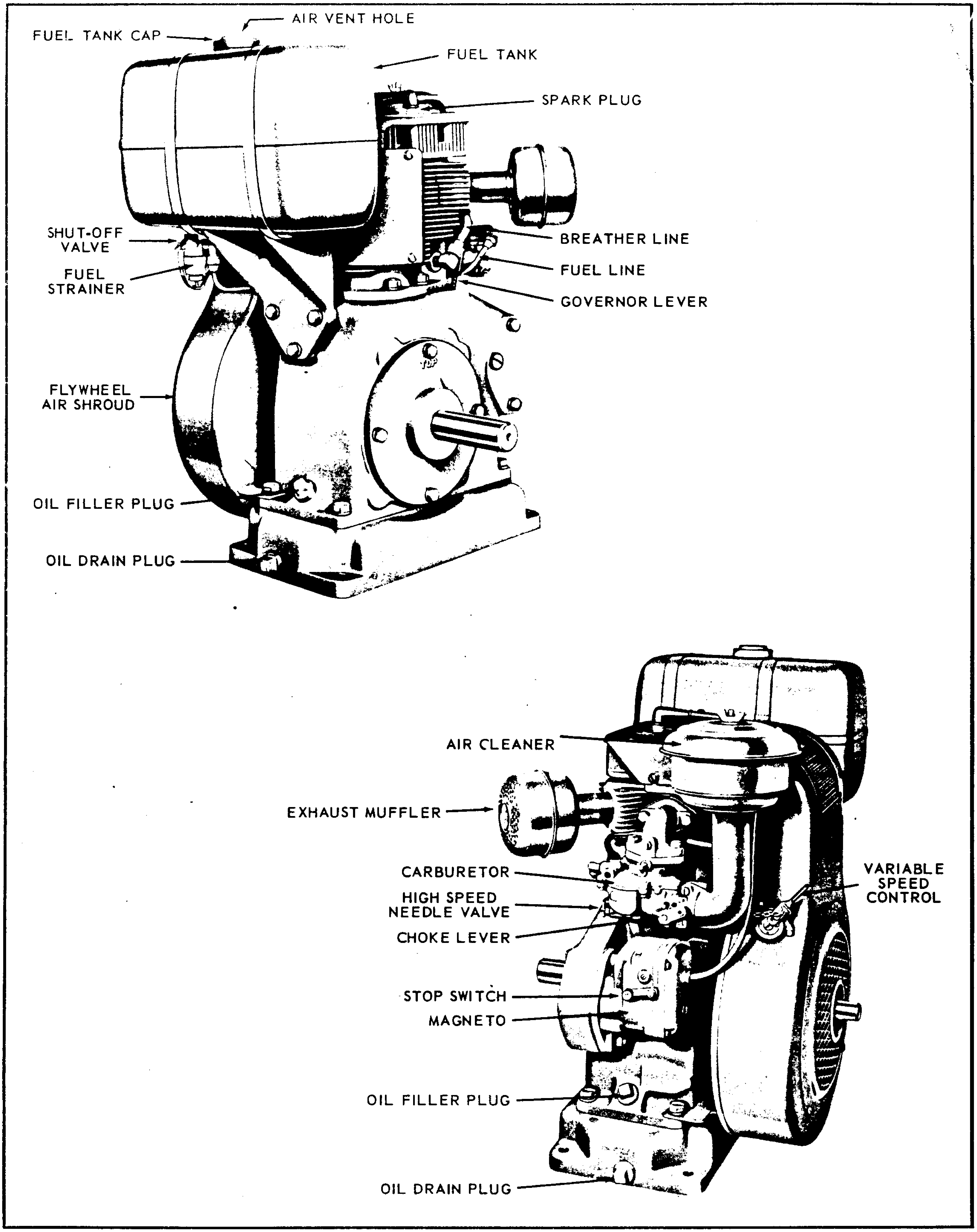


231078C
231077C

Fig. 1

MODEL AGND ENGINE

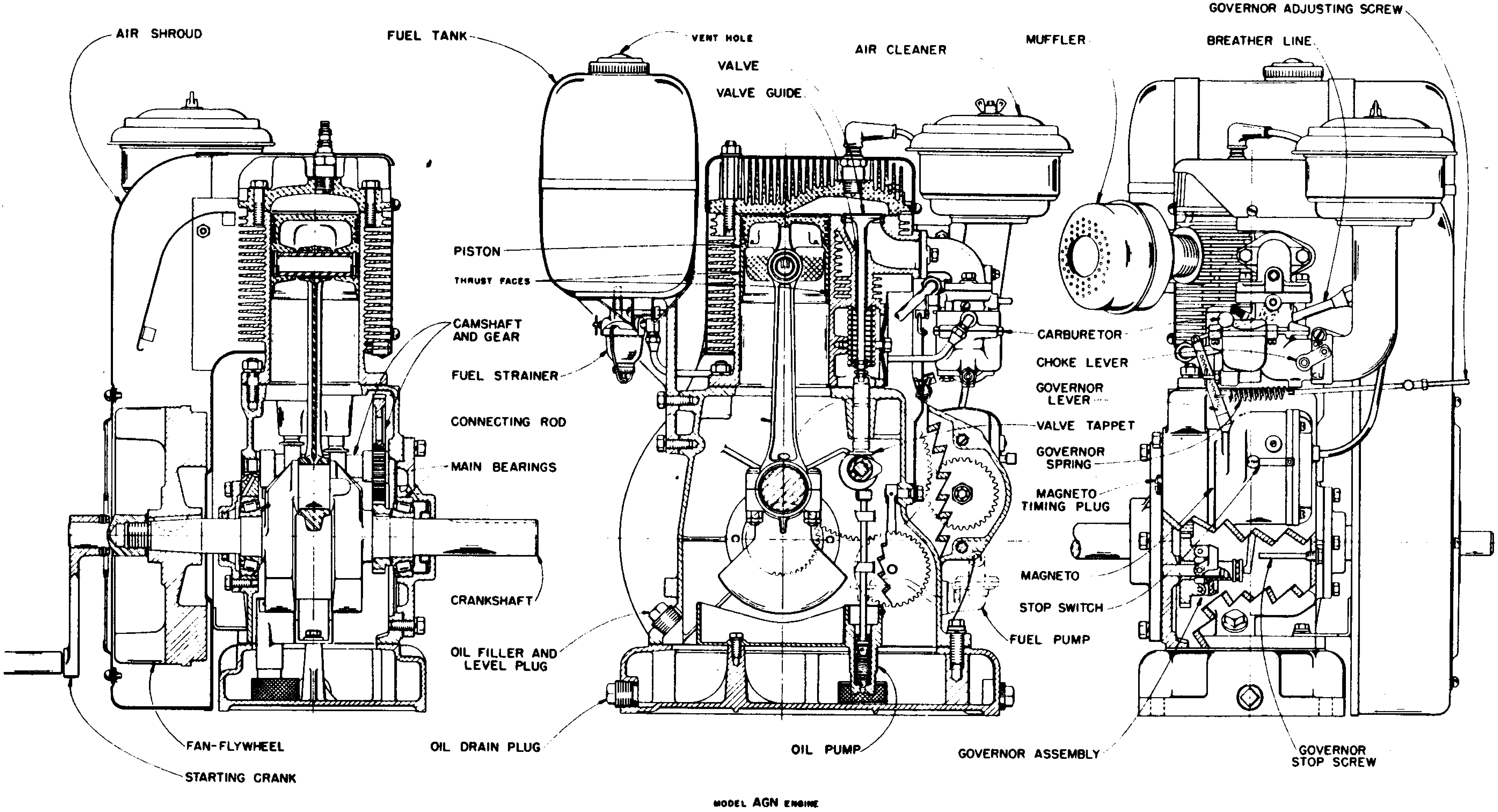


Fig. 2

SECTIONAL VIEWS OF MODEL AGND ENGINE

GENERAL INFORMATION AND DESIGN

Wisconsin engines are of the four cycle type, in which each of the four operations of suction, compression, expansion and exhaust requires a complete stroke. This gives one power stroke for each two revolutions of the crankshaft.

COOLING

Cooling is accomplished by a flow of air, circulated over the cylinder and head of the engine, by a combination fan-flywheel encased in a sheet metal shroud. The air is divided and directed by ducts and baffle plates to insure uniform cooling of all parts.

> ***Never operate an engine with any part of the shrouding removed, because this will retard the air cooling.***

CARBURETOR

The proper combustible mixture of gasoline and air, is furnished by a balanced carburetor, giving correct fuel to air ratios for all speeds and loads.

IGNITION

The spark for ignition of the fuel mixture is furnished by a high tension magneto driven off the timing gears at crankshaft speed. The magneto is fitted with an impulse coupling, which makes possible a powerful spark for easy starting. Also, the impulse coupling automatically retards the timing of the spark for starting, thus eliminating danger of a kick back from the engine when starting. When electric starter and generator are furnished, battery ignition is used. *See Page 11.*

LUBRICATION SYSTEM

Lubrication is of the constant oil level splash type. A plunger pump maintains the proper oil level in a trough under the connecting rod. The action of the dipper on the connecting rod, striking the oil in the trough, provides ample lubrication for all internal parts of the engine, as illustrated in *Fig. 3.*

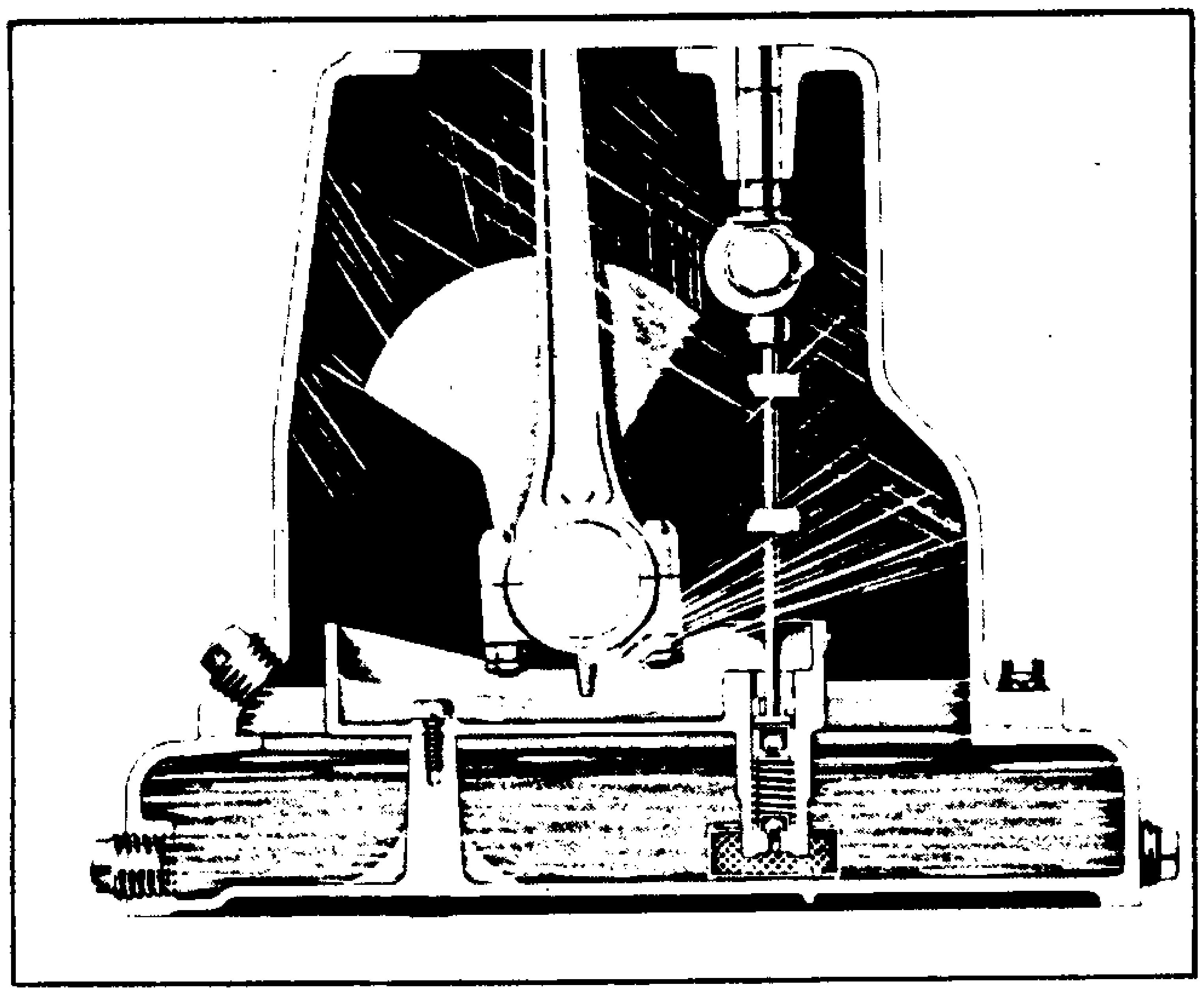


Fig. 3 232350C

GOVERNOR

A governor of the centrifugal flyball type controls the engine speed by varying the throttle opening to suit the load imposed upon the engine. All engines are equipped with either ***fixed speed*** governors, a ***variable speed regulator*** to control the governed speed of the engine, or an ***idle control.***

ROTATION

The rotation of the crankshaft is clockwise when viewing the flywheel or cranking end of the engine. This gives ***counter-clockwise*** rotation when viewing the power take-off end of the engine. The flywheel end of the engine is designated the front end, and the power take-off end, the rear end of the engine.

HORSEPOWER

R.P.M.	HORSEPOWER
1600	7.7
1800	9.2
2000	10.2
2200	10.9
2400	11.5
2600	11.9
2800	12.2
3000	12.4
3200	12.5

The horsepower given in the above chart is for an atmospheric temperature of 60° Fahrenheit, at sea level, and at a Barometric pressure of 29.92 inches of mercury.

For each inch lower Barometer reading deduct 3½% from above horsepower.

For each 10° higher temperature there will be a reduction in horsepower of 1%.

For each 1000 ft. altitude above sea level there will be a reduction in horsepower of 3½%.

The friction in new engines cannot be reduced to the ultimate minimum during the regular block test, but engines are guaranteed to develop at least 85 per cent of maximum power when shipped from the factory. The power will increase, as friction is reduced, during a few days of operation. The engine will develop at least 95% of power shown on chart when friction is reduced to a minimum.

For continuous operation allow 20% of horsepower shown, as a safety factor.

INSTRUCTIONS FOR STARTING AND OPERATING

LUBRICATION

Before starting the engine, fill the base with good gas engine oil through the filler plug opening illustrated in *Fig. 1.* The oil should be filled to the level of the filler plug hole. This requires 7 pints. Be sure the oil is clean, and also the funnels or measures used in filling.

For *run-in of new engines,* use same oil as recommended in *Grade of Oil Chart.*

Too much emphasis cannot be given to the matter of oil selection. Use only high-grade, highly refined oils, corresponding in body to the S. A. E. (Society of Automotive Engineers) Viscosity Numbers listed in *Grade of Oil Chart.* These will prove economical and assure long engine life.

SERVICE CLASSIFICATION OF OIL

In addition to the S. A. E. Viscosity grades, oils are also classified according to severity of engine service. Use oils classified by the American Petroleum Institute as ***Service MS*** or ***SD***. This type of oil is for engines performing under unfavorable or severe operating conditions such as: high speeds, constant starting and stopping, operating in extreme high or low temperatures and excessive idling.

GRADE OF OIL

SEASON OR TEMPERATURE	GRADE OF OIL
Spring, Summer or Fall + 120°F to + 40°F	SAE 30
Winter + 40°F to + 15°F + 15°F to 0°F Below Zero	 SAE 20-20W SAE 10W SAE 5W-20
Use oils classified as Service MS or SD	
Crankcase Capacity	3½ Quarts

Follow summer recommendations in winter if engine is housed in warm building.

Check oil level every 8 hours. The old oil should be drained every 50 hours of operation.

To drain oil, remove oil drain plug shown in *Fig. 1.* Oil should be drained while engine is hot, as it will then flow more freely.

FUEL

The fuel tank should be filled with a ***good quality*** gasoline free from dirt and water. The capacity of the tank is ***2½ gallons***. Some of the poorer grades of gasoline contain gum which will deposit on valve stems, piston rings, and in the various small passages of the carburetor, causing trouble in operating, and in fact might prevent the engine from operating at all.

Use only reputable, well known brands of gasoline of the REGULAR GRADE.

The gasoline should have an octane rating of at least 90. Fuel with a low octane rating will cause detonation, and if operation is continued under this condition, severe damage will result to the engine. The cylinder and piston will be scored, head gasket blown out, bearings will be damaged, etc.

STARTING

STARTING PROCEDURE (Fig. 4)

1. Check crankcase and air cleaner oil level, and fuel supply. Open fuel shut-off valve.
2. The ***high speed adjustment*** on the carburetor is made when engine is tested at the factory. *Refer to 'Carburetor—Adjustment' for further information.*
3. Disengage clutch, if furnished.
4. Set throttle about 1/2 open.
5. Pull out ignition switch button, if applicable. (Switch tag reads *"To Stop Push In"*). Engines less electric starter – and with magneto ignition – have a switch on the side of the magneto. The lever type switch is always in the **ON** or running position except when depressed for stopping.
6. Close choke by pushing choke lever down. Turn engine over one or two revolutions, and then open choke half-way. Apply the crank at flywheel end of engine and pull up briskly in a clockwise direction. ***Do not*** attempt to ***spin*** the engine with the starting crank. If engine does not start on the first pull up of the crank, re-engage crank and repeat the operation.

   With electric starting motor; depress starter button in place of hand cranking.
7. After engine starts ***open choke,*** as required for smooth running. Less choking is necessary in warmer weather or when the engine is warm, than when it is cold. Should flooding occur, open choke fully and continue cranking.

If all conditions are right, engine will start promptly after one or two attempts. Allow engine to warm up a few minutes before applying load, as prescribed in ***'Warm-Up Period'*** paragraphs.

New engines should be "run-in" gradually to insure trouble-free service. Refer to *"Starting and Operation of New Engine"*, on the inside front cover of this manual, for correct "running-in" procedure.

WARM-UP PERIOD

The engine should be allowed to warm up to operating temperature before load is applied. This requires only a few minutes of running at moderate speed. ***Racing an engine*** or ***gunning it,*** to hurry the warm-up period, ***is very destructive*** to the polished wearing surfaces on piston, rings, cylinder, bearings, etc., as the proper oil film on these various surfaces cannot be established until the oil has warmed up and become sufficiently fluid. This is especially important on new engines and in cool weather.

Racing an engine by disconnecting the governor, or by doing anything to interfere with the governor controlled engine speed, ***is extremely dangerous.*** The governor is provided as a means for controlling the engine speed to suit the load applied, and also as a safety measure to guard against excessive speeds, which not only overstrain all working parts, but which might cause wrecking of the engine and possible injury to bystanders.

All parts of the engine are designed to safely withstand any speeds which might normally be required, but it must be remembered that the stresses set up in rotating parts increase with the square of the speed. That means that if the speed is doubled, the stresses will be quadrupled, and if the speeds are trebled, the stresses will be nine times as great.

Strict adherence to the above instructions cannot be too strongly urged, and greatly increased engine life will result as a reward for these easily applied recommendations.

STOPPING ENGINE

Engines with magneto ignition have a lever type ground switch on the side of the magneto. To stop, depress lever and ***hold down until engine stops***. *See Fig. 1.*

Battery ignition engines are furnished with an ignition switch, "*To Stop Push In*".

If the engine has been running hard and is hot, do not stop it abruptly from full load, but remove the load and allow engine to run idle at 1000 to 1200 R.P.M. for three to five minutes. This will reduce the internal temperature of the engine much faster, minimize valve warping, and of course the external temperature, including the manifold and carburetor will also reduce faster, due to air circulation from the flywheel.

CARBURETOR – ADJUSTMENT (Fig. 4)

Turn ***high speed needle valve in***, (clockwise) until it seats, then turn *out*, (counter-clockwise) 1¼ turns. With engine warmed up and running at operating speed, adjust ***needle valve*** until engine runs smoothly. If engine stalls when load is applied, open needle valve a ***very slight*** amount each time, until correct fuel setting is obtained. In cold weather, starting may be facilitated by opening the needle valve slightly, then resetting it to normal position after engine is started.

The correct amount of throttle plate opening for the proper low idle speed is obtained by means of the ***throttle stop screw***. However, this is set at the factory so that no immediate adjustment is necessary. The ***idle needle*** is for smooth low speed operation and this adjustment, if necessary, must be made with the carburetor throttle lever closed. Initial setting is 1¼ turns off seat. For further information, see the carburetor service instructions in rear of manual.

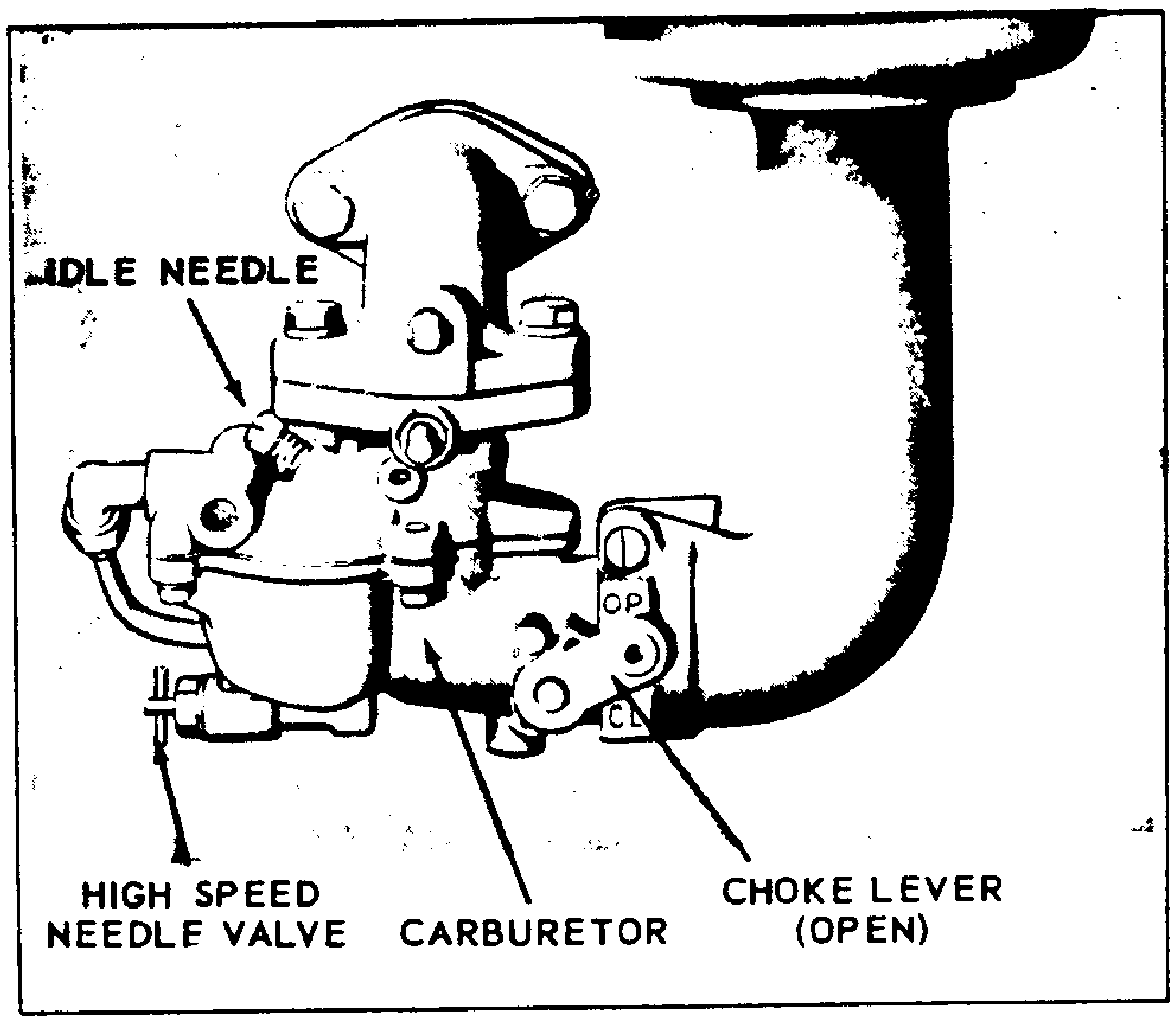


Fig. 4 232351C

MAINTENANCE

AIR CLEANERS

The ***dry element*** type air cleaner, illustrated in *Fig. 4A*, is standard equipment on this model of engine. An ***oil bath*** air cleaner, *Fig. 5*, is furnished upon request.

DRY ELEMENT AIR CLEANER (Fig. 4A)

Service daily, if engine is operating in very dusty conditions. Remove cartridge and shake out the accumulated dirt (do not tap or strike element – it may become damaged). Wipe out dirt from inside cover.

Once each week; the filtering cartridge should be taken out and rinsed under a faucet with cold water, then wash by repeated dipping for several minutes in a solution of lukewarm water and a mild, ***non-sudsing*** detergent. Rinse in cold water from the inside out, and allow to dry overnight before installing. In cold weather, protect element from freezing until dry. *Excessive smoke or loss of power are good indications that the element requires cleaning.*

> ***Do not use gasoline, kerosene or solvent for cleaning – Do not oil element.***

After ***five*** washings or one year of service, whichever comes first, replace cartridge. New cartridges are available at your ***Wisconsin Motor dealer***. Refer to parts list section for replacement part number.

OIL BATH AIR CLEANER (Fig. 5)

Service daily, if engine is operating in very dusty conditions. Detailed instructions are printed on the air cleaner.

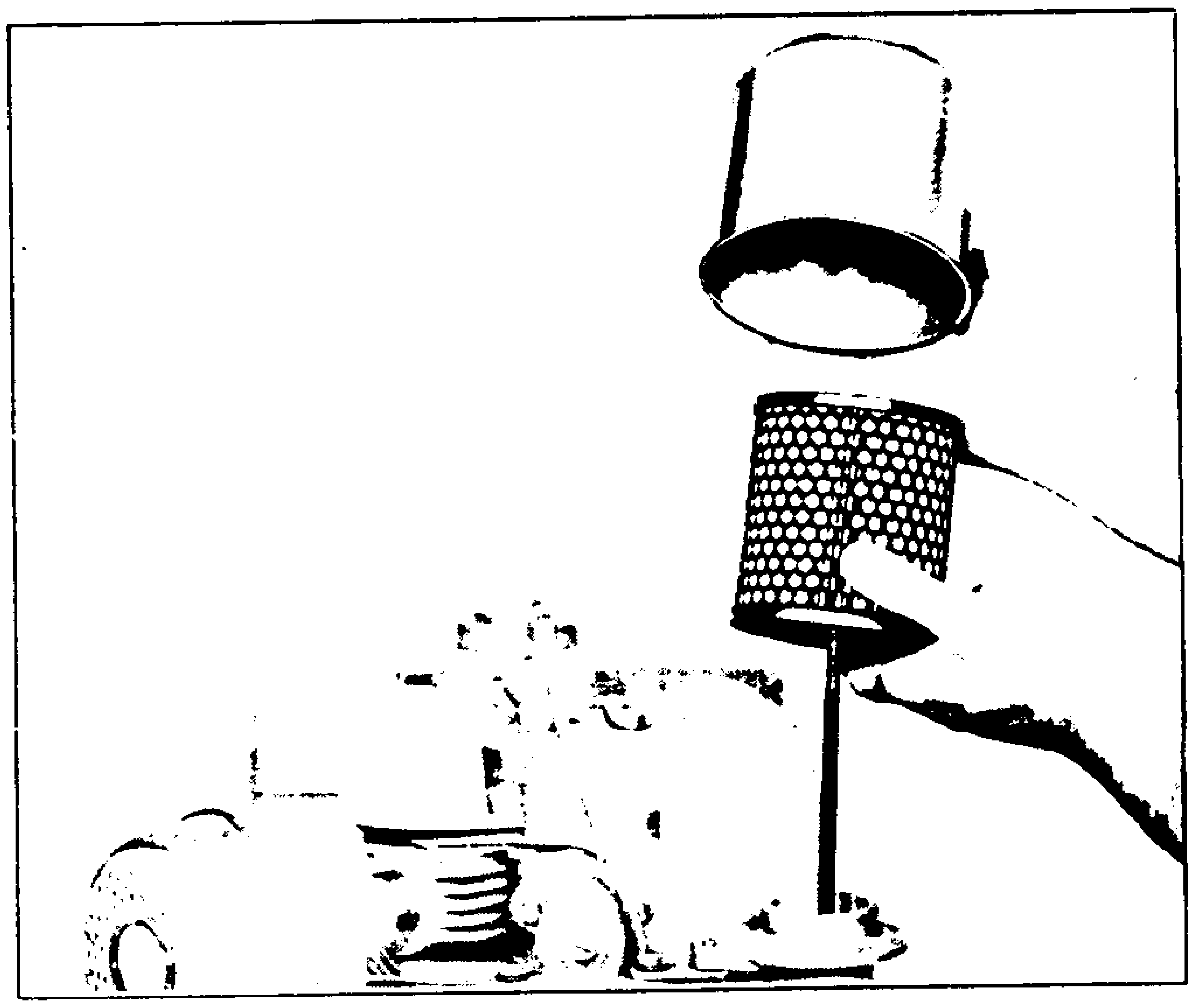


Fig. 4A 289863C

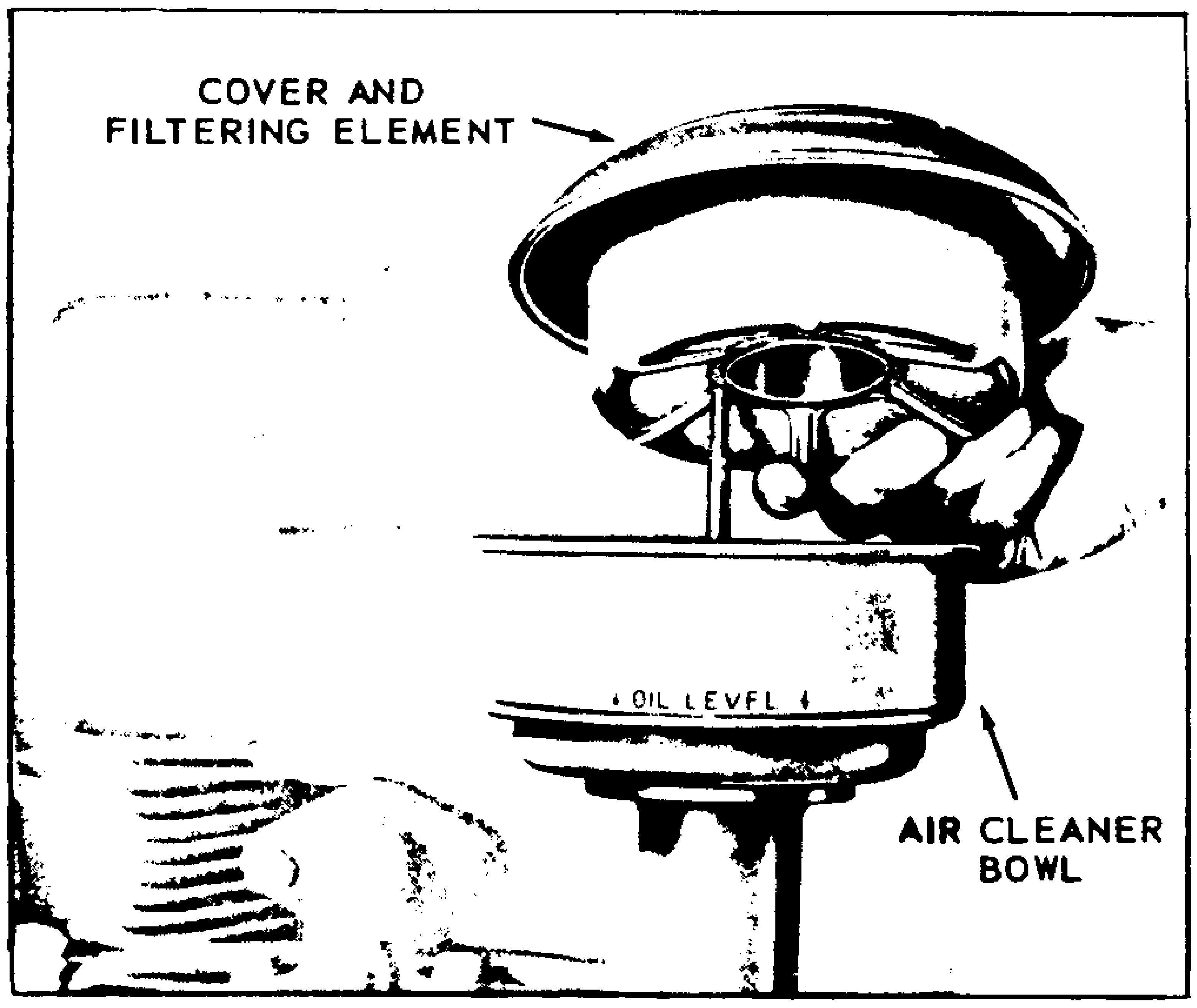


Fig. 5 231084C

Unscrew wing nut and remove the cover and filtering element from the air cleaner. *See Fig. 5.* Fill bowl to ***oil level line*** with the same grade of oil as used in the crankcase.

The air cleaner must be serviced frequently, depending on the dust conditions where the engine is being operated. When the oil in the bowl becomes dirty, it should be removed and replaced with new oil. The filtering element should be washed in solvent if it shows signs of collected dust. This servicing will vary from a few days of operation in comparatively clean conditions to twice a day in dusty conditions. Detailed instructions are printed on the Air Cleaner.

Operating the engine under dusty conditions without oil in the air cleaner or with dirty oil, may wear out cylinder, piston, rings and bearings in a few days time, and result in costly repairs.

Daily attention to the air cleaner is one of the most important considerations in prolonging engine life.

GASOLINE STRAINER

The gasoline strainer on the bottom of the fuel tank is very necessary to prevent sediment, dirt, and water from entering the carburetor and causing trouble, or even complete stoppage of the engine. The glass strainer bowl should be inspected frequently and cleaned if dirt or water is present. To remove bowl, first shut off fuel valve, then loosen the knurled nut below the bowl and swing the wire bail to one side. After cleaning the bowl and screen, replace the parts, being sure that the gasket is in good condition, if not, use a new gasket. *See Fig. 6.*

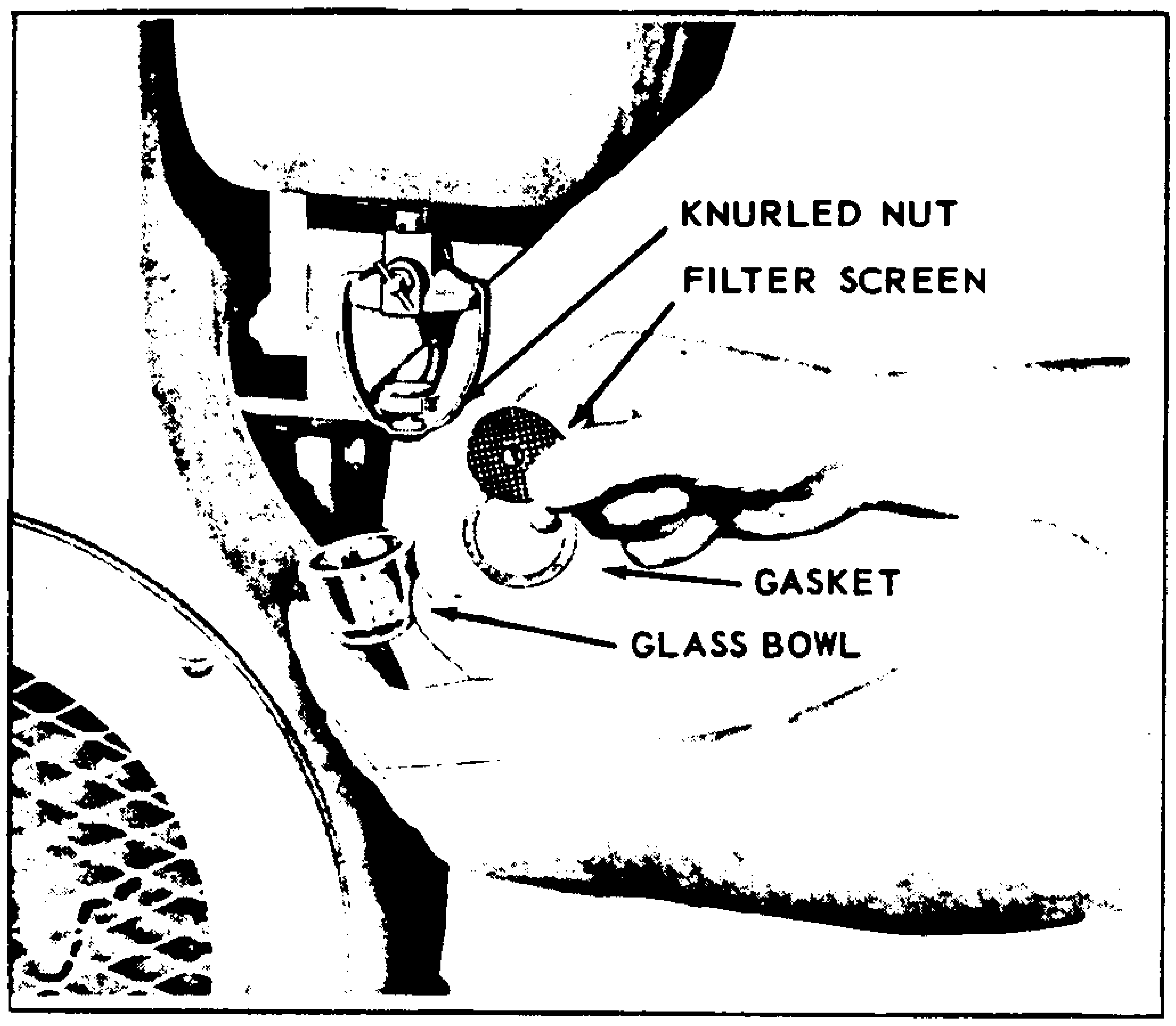


Fig. 6 231083C

FUEL PUMP

Fuel pump is an optional accessory. Due to special machining of crankcase, fuel pump can be furnished only upon request, when engine is purchased from factory. Instructions for fuel pump maintenance and repair are located in the back of this manual.

MAGNETO – BREAKER POINT ADJUSTMENT

Magnetos are properly adjusted and timed before leaving the factory. The breaker points of the Fairbanks-Morse and Wico Magnetos should have an opening of .015" at full separation. If the spark becomes weak after continued operation, it may be necessary to readjust these points. To do this, first remove the end cover on the magneto to expose the breaker points. The following instructions are for the Fairbanks-Morse magneto, but can be applied to the Wico magneto as well.

The crankshaft should be rotated by turning the starting crank, (this also rotates the magneto) until the breaker points are wide open. The opening or gap should then be measured with a feeler gauge as shown in *Fig. 9.*

To readjust points, first loosen the ***locking screws*** on the ***contact plate*** enough so that the plate can be moved. Insert the end of a small screw driver into the ***adjusting slot*** at the bottom of the contact plate and open or close the contacts by moving the plate until the proper opening is obtained. *See Fig's. 9 and 10.*

After tightening the locking screws, recheck breaker point gap to make sure it has not changed. If it is found that the breaker points have become rough,

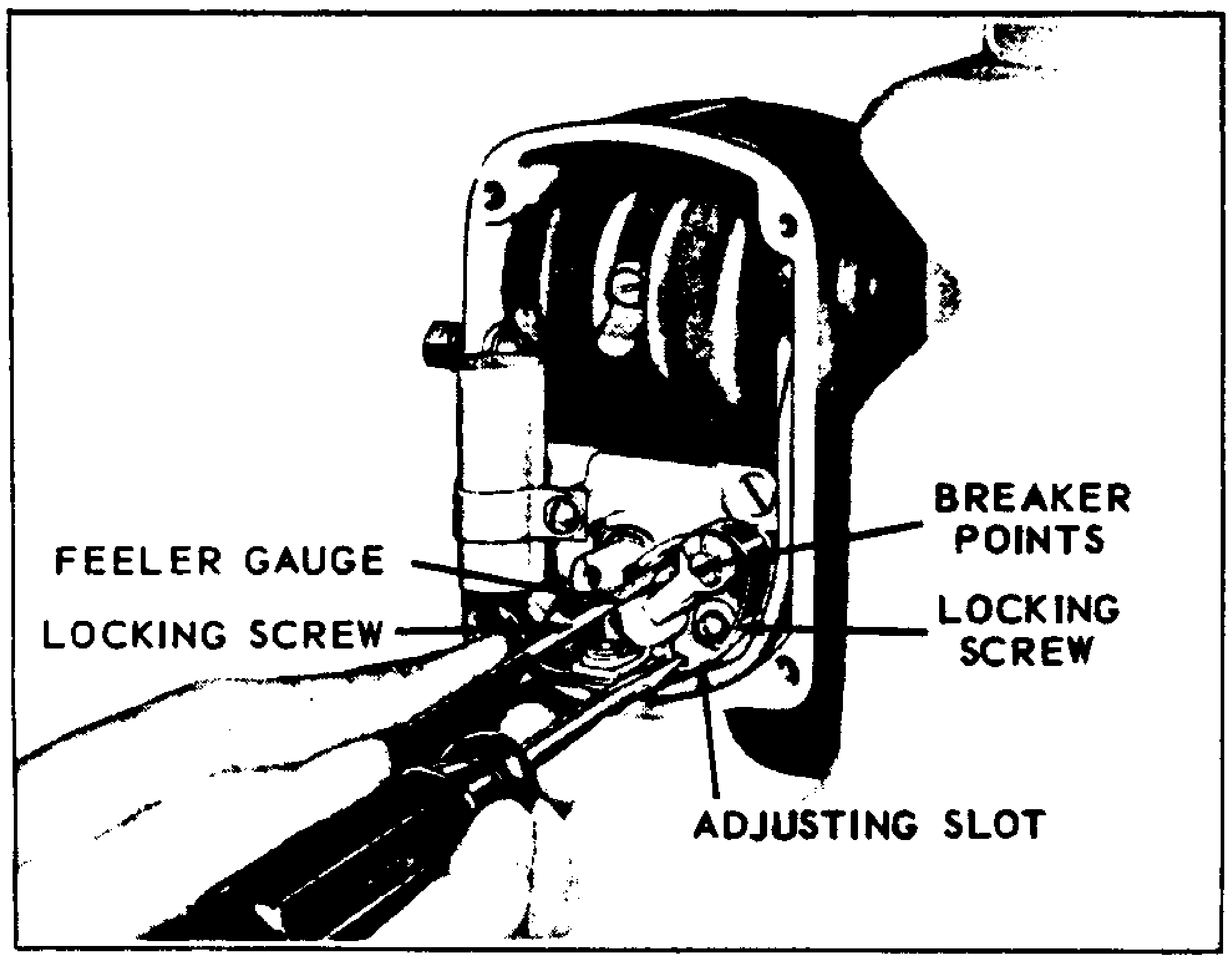
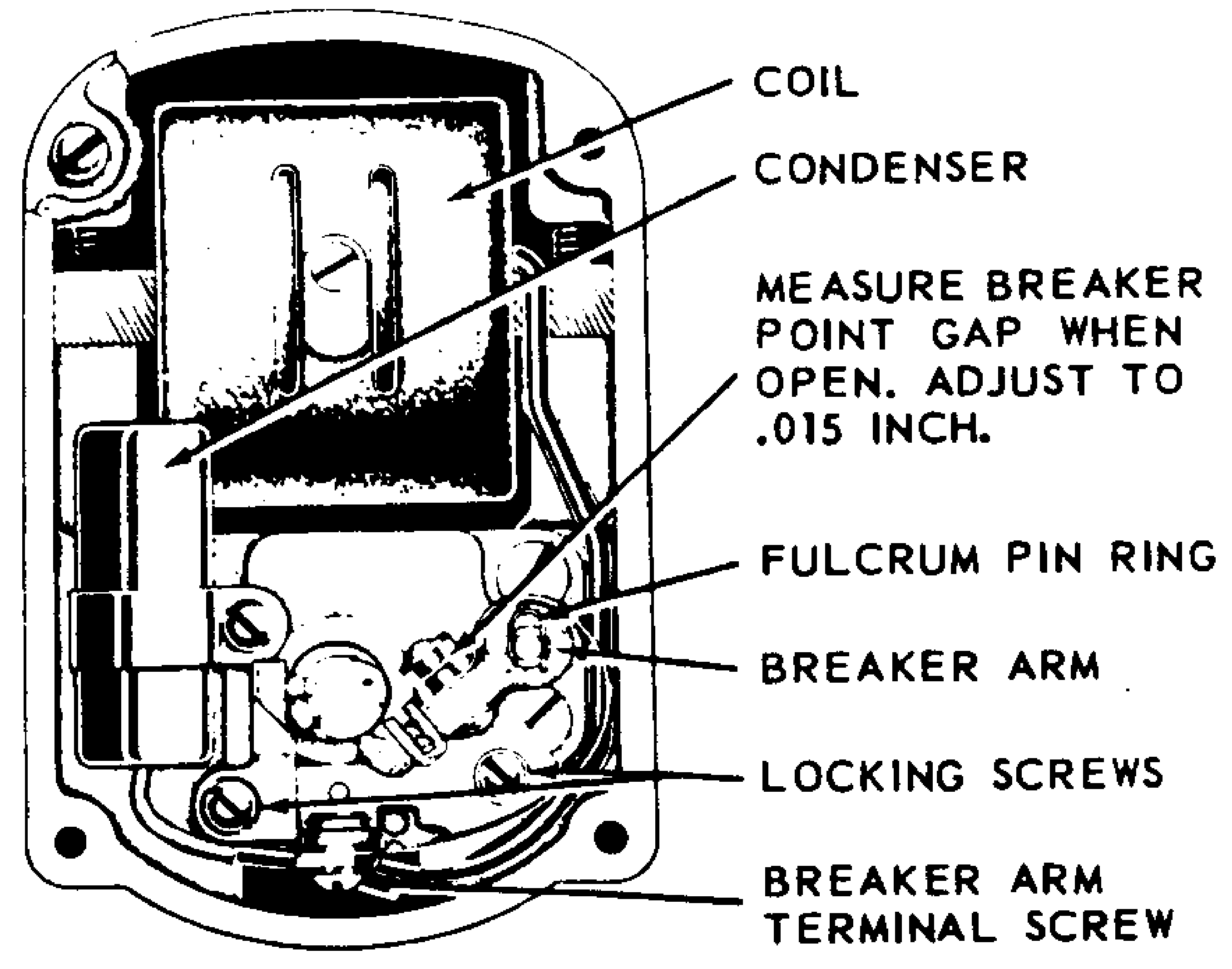


Fig. 7 231086C


COIL
CONDENSER
MEASURE BREAKER POINT GAP WHEN OPEN. ADJUST TO .015 INCH.
FULCRUM PIN RING
BREAKER ARM
LOCKING SCREWS
BREAKER ARM TERMINAL SCREW

END VIEW OF FAIRBANKS-MORSE MAGNETO
Fig. 8

they should be resurfaced with a breaker point file before the above adjustments are made. Replace magneto end cover carefully so that it will seal properly. Do not force cover screws too tightly on the magneto as the cover may crack.

For further information, see service instructions for the Fairbanks-Morse and Wico magnetos in the back of this manual.

MAGNETO IGNITION SPARK

If difficulty is experienced in starting the engine or if engine misses firing, test the strength of the ignition spark. Remove the ignition cable from the spark plug and hold the ignition cable terminal about 1/8 inch from any metal part of the engine, *see Fig. 9*. If the ignition cable has a molded rubber spark plug terminal at the end, wedge a piece of bare wire up into the terminal, and let one end of the wire extend out. Turn engine over. When the impulse coupling on the magneto snaps, there should be a good spark at the ignition cable terminal or wire. If there is a weak spark, or none at all, first check breaker point opening as mentioned in preceding paragraph under **Magneto**. If this does not remedy the trouble, it may be necessary to install a new condenser. See ***Fairbanks-Morse*** or ***Wico*** maintenance manual in the back of this manual.

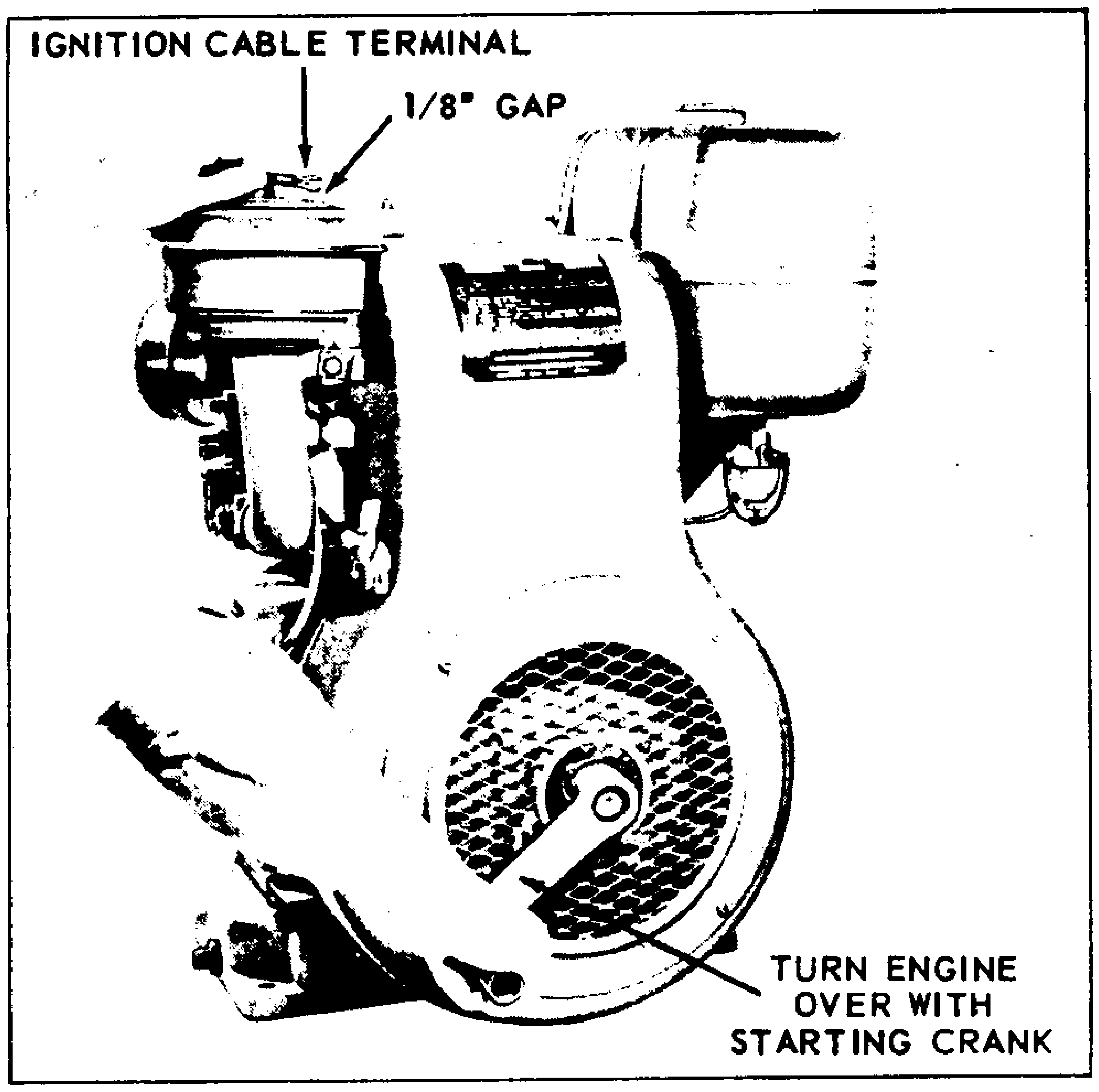


Fig. 9 231079C

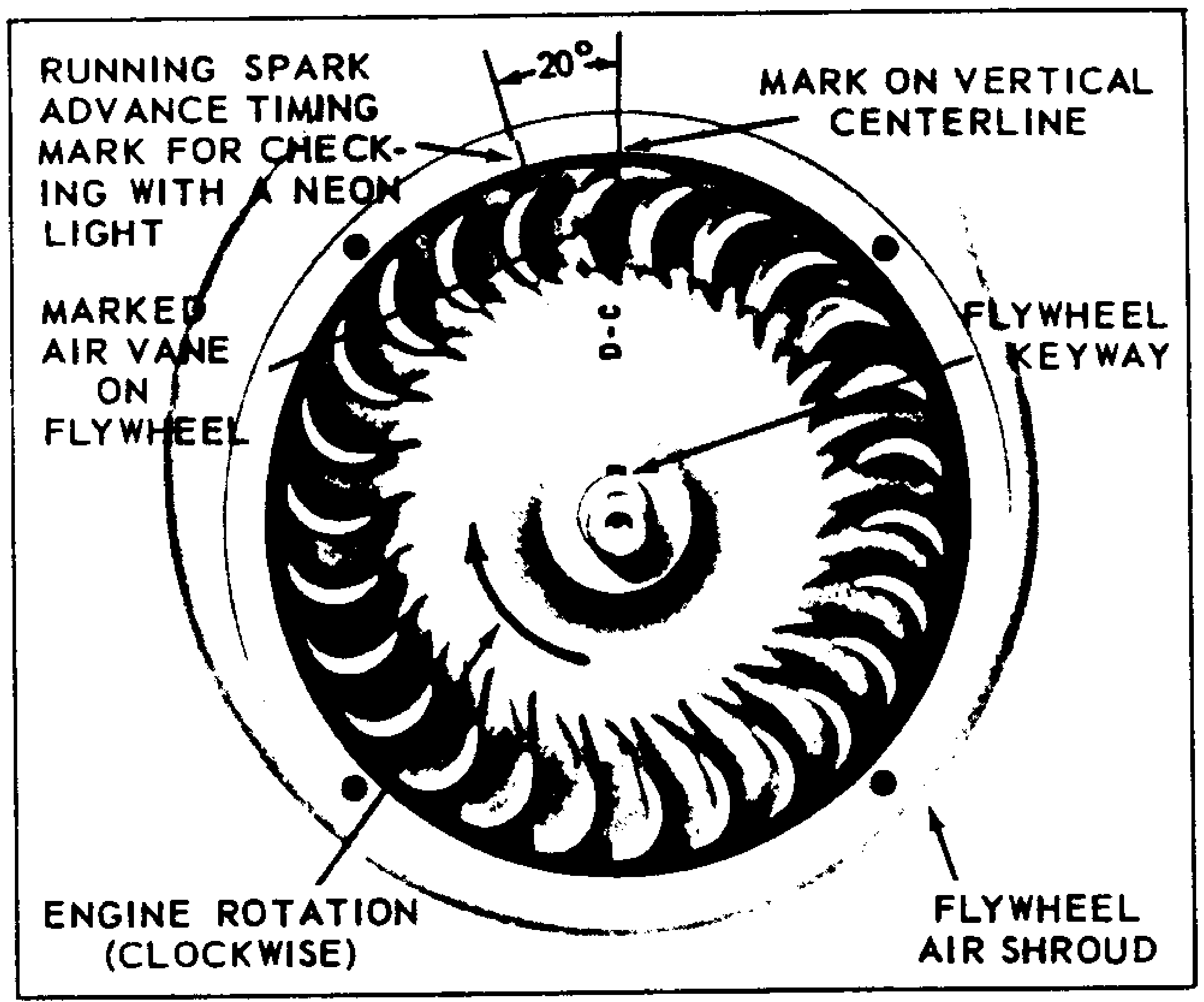

RUNNING SPARK ADVANCE TIMING MARK FOR CHECKING WITH A NEON LIGHT
20°
MARK ON VERTICAL CENTERLINE
MARKED AIR VANE ON FLYWHEEL
D-C
FLYWHEEL KEYWAY
ENGINE ROTATION (CLOCKWISE)
FLYWHEEL AIR SHROUD

Fig. 10 208068C-1A

MAGNETO TIMING

If it is necessary to remove the magneto for cleaning or repairs, it is important that the magneto be reassembled properly so that it is timed correctly to the engine.

First remove the screen over the flywheel air intake opening by taking out the screws holding the screen in place. This will expose the ***timing marks*** on flywheel and shroud for timing magneto. *See Fig. 10.*

Next, remove the spark plug to make cranking easier. Then turn engine over slowly with the hand crank, until the compression in the cylinder blows the air out thru the spark plug hole.

The flywheel is marked with the letters **'DC'** near one of the air circulating vanes. This vane is further identified by an **'X'** mark cast on the end. *See Fig. 10.* When the air blows out of the spark plug hole, continue turning the crank, until the edge of the ***marked vane*** on flywheel is on line with the ***mark*** on the ***vertical centerline*** of the shroud, as shown in *Fig. 10.* Leave flywheel in this position. At this point, the piston is on top dead center and the ***keyway*** for mounting the flywheel is also on top.

Remove the inspection plug from the crankcase, at the take-off end of the engine. The ***timing mark*** between two camshaft gear teeth will be visible thru this opening. Mount the magneto to the engine so that the **'O'** marked tooth on the face of the magneto gear matches up with the **'I'** mark on the face of the camshaft gear, as shown thru the inspection hole in *Fig. 11.*

Tighten magneto securely in place, being sure magneto flange gasket is in place.

When the magneto is properly timed, the impulse coupling will snap when the **'DC'** and **'X'** marked

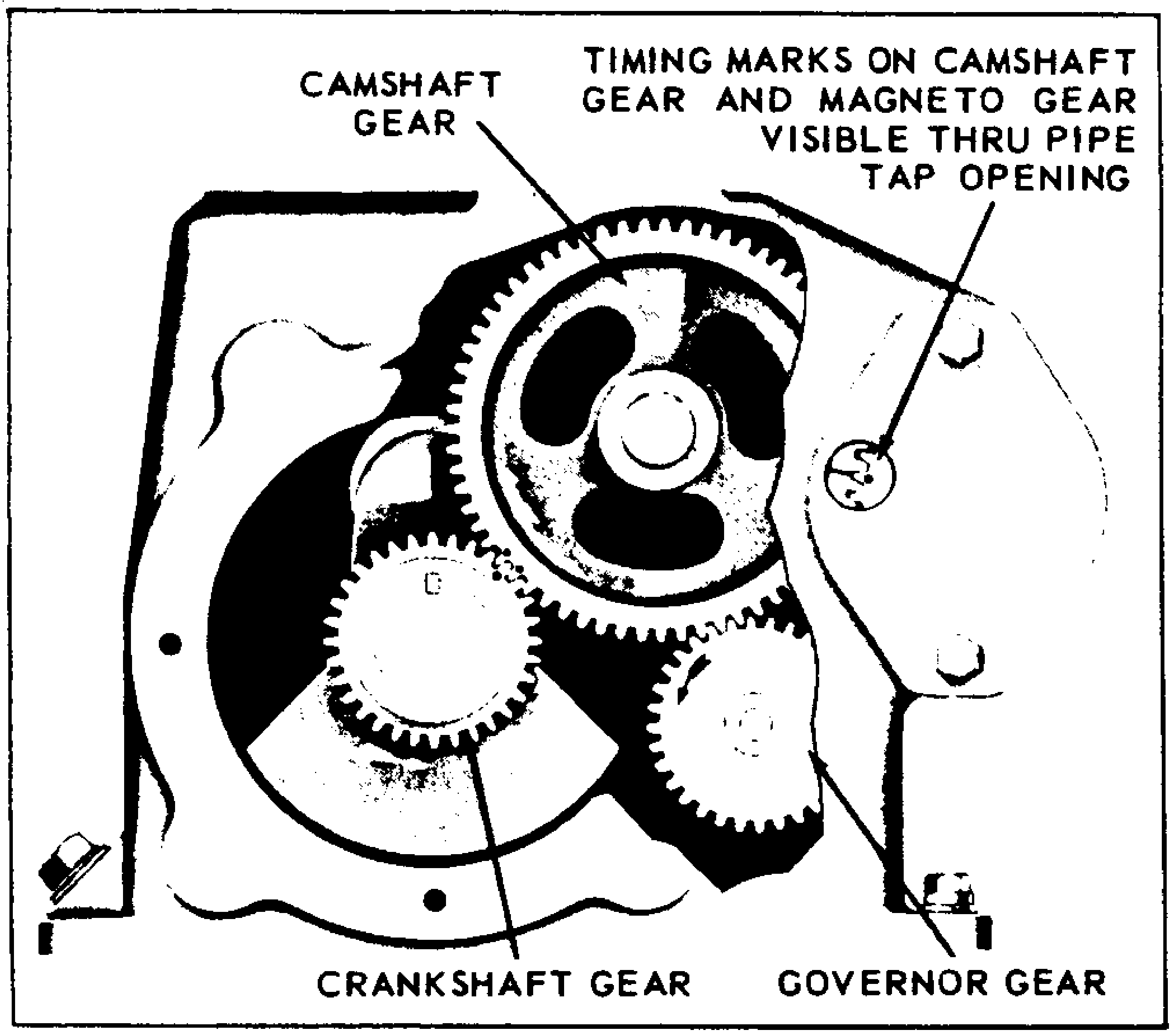

CAMSHAFT GEAR
TIMING MARKS ON CAMSHAFT GEAR AND MAGNETO GEAR VISIBLE THRU PIPE TAP OPENING
CRANKSHAFT GEAR
GOVERNOR GEAR

Fig. 11 232352C

vane of the flywheel lines up with the ***mark*** on the flywheel shroud which indicate the ***vertical centerline*** of the cylinder. This can be checked by turning crankshaft over slowly by hand.

The proper ***spark advance is 20°***. For checking timing with a ***neon light***, the running spark advance is indicated by a ***mark*** on the flywheel shroud, 20° before ***vertical centerline*** of the cylinder. *See Fig. 10.* The end of the **'X'** marked vane should be whitened with chalk or paint for this operation.

BATTERY IGNITION TIMING

These engines are properly timed at the factory, but the following instructions are given as a help in retiming, if this becomes necessary.

Remove the screen over the flywheel air intake opening by taking out the screws holding the screen in place. This will expose the timing marks on the flywheel shroud, also the ***vane*** on flywheel, marked by an **'X'** and the letters **'DC'**. *See Fig. 10.* Next, remove the sparkplug from cylinder and turn the engine over slowly by the hand crank, at the same time holding a finger over the spark plug hole, so that the compression stroke can be determined by the air blowing out of the hole.

Upon reaching the compression stroke, continue turning the crank, until the leading edge of the ***marked vane*** on the flywheel is in line with the ***centerline mark*** on the flywheel shroud. The piston is on top dead center. *See Fig. 10.* Keep flywheel in this position.

Assuming that the timer assembly is removed from the engine, turn the ***cam***, by means of the ***drive gear***, in a clockwise direction until the ***breaker points*** are just beginning to open. Mount timer assembly to engine. *See Fig. 12,* which shows the position of the timer on the engine.

The running ***spark advance is 20°*** of crankshaft or timer rotation. The timer has an automatic advance of 15°, thus requiring an initial advance setting of 5°.

With the timer assembly mounted securely in place, loosen the ***clamp lever screw***. To get the initial 5° advance required; with the ***breaker points*** just beginning to open, turn the ***timer body*** in a counter-clockwise direction through an angle of 5°, which is equal to about 1/8 inch on the outside circumference of the timer body. Tighten ***clamp lever screw.***

If care is exercised in the above operations, the spark timing should be accurate enough for satisfactory operation, however checking spark advance with a neon lamp, as described in *'Neon Lamp Timing'*, is recommended.

The breaker point gap should be .020 inch. This opening must be checked before the timer body is set, otherwise any adjustment made to the breaker point opening will change the ignition advance adjustment. To readjust the breaker point gap, turn the engine over by means of the hand crank so that the ignition timer breaker arm ***rubbing block*** is on a high point of

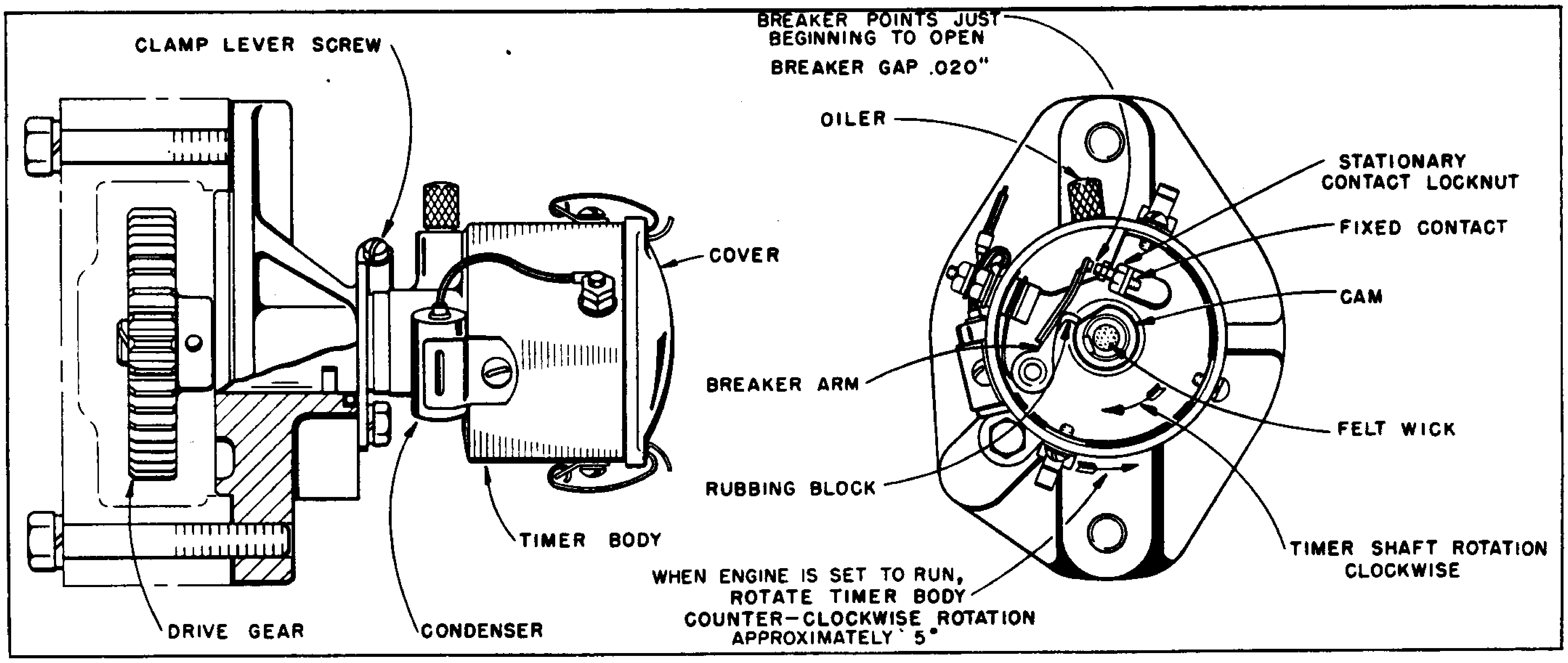
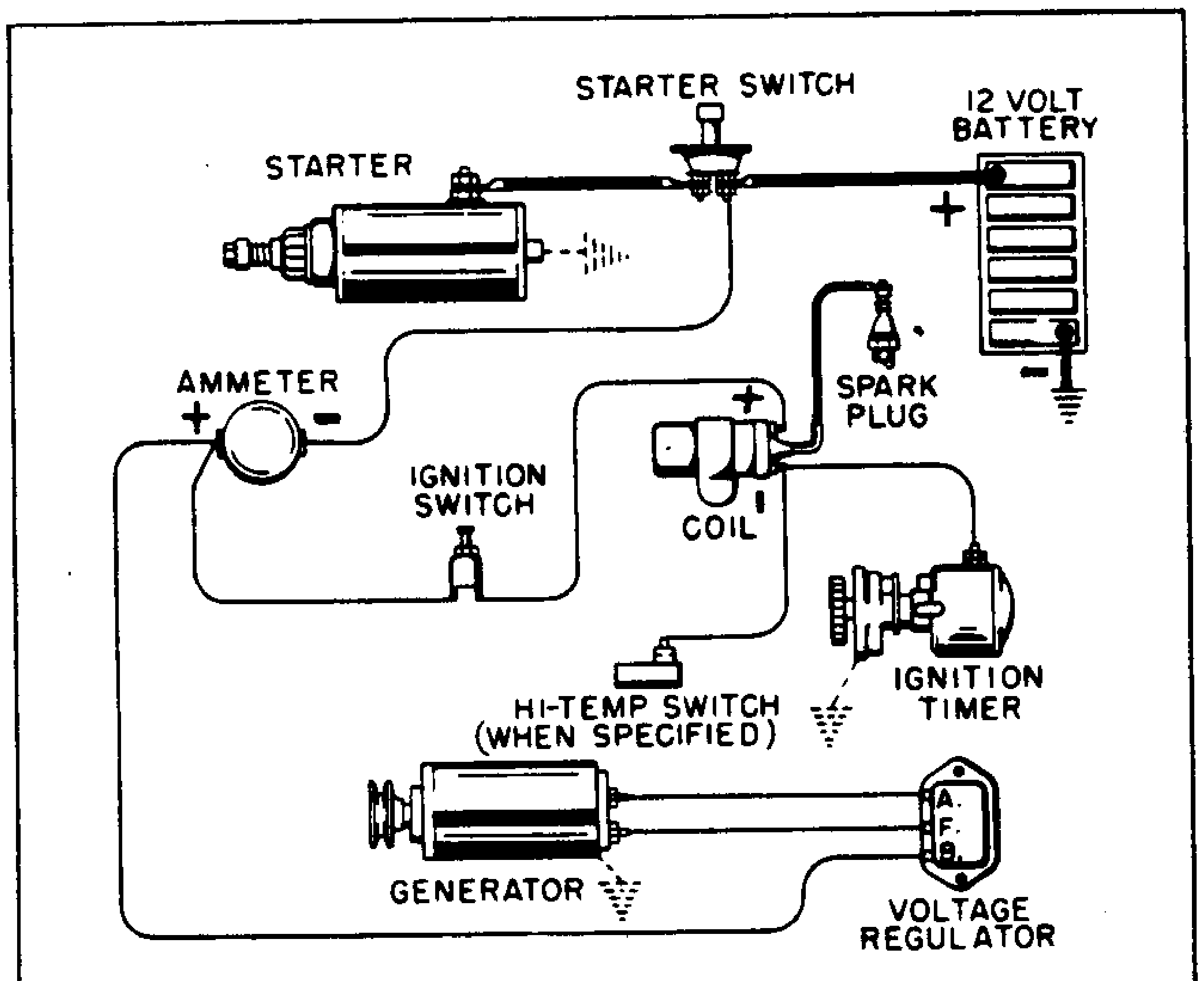

CLAMP LEVER SCREW
BREAKER POINTS JUST BEGINNING TO OPEN
BREAKER GAP .020"
OILER
STATIONARY CONTACT LOCKNUT
FIXED CONTACT
COVER
CAM
BREAKER ARM
FELT WICK
RUBBING BLOCK
TIMER BODY
TIMER SHAFT ROTATION CLOCKWISE
WHEN ENGINE IS SET TO RUN, ROTATE TIMER BODY COUNTER-CLOCKWISE ROTATION APPROXIMATELY 5°
DRIVE GEAR
CONDENSER

Fig. 12
IGNITION TIMER

the *cam*. Loosen ***stationary contact locknut*** and screw ***fixed contact***, in or out, until .020 inch gap is obtained. Tighten locknut and recheck gap. *See Fig. 12.*

NEON LAMP TIMING – TIMER IGNITION (Fig. 14)

Timing should be checked with a neon lamp connected in series with the spark plug. Chalk or paint the end of the 'X' marked vane on the flywheel, white. Then with the engine operating at 2000 R.P.M. or over, allow the flash from the neon lamp to illuminate the whitened vane. At the time of the flash, the leading edge of the vane should line up with the ***running spark advance timing mark*** on the flywheel shroud. If it does not, the ***clamp lever screw*** should be loosened and the timer body turned slightly clockwise or counterclockwise, as required, until the ***advance timing mark*** and the ***white vane*** coincide. Tighten ***clamp lever screw***.



NEGATIVE GROUND Circuit illustrated. If **POSITIVE GROUND** Generator is used; reverse Ammeter, and Coil Terminal Connections.

Fig. 13, **WIRING DIAGRAM**

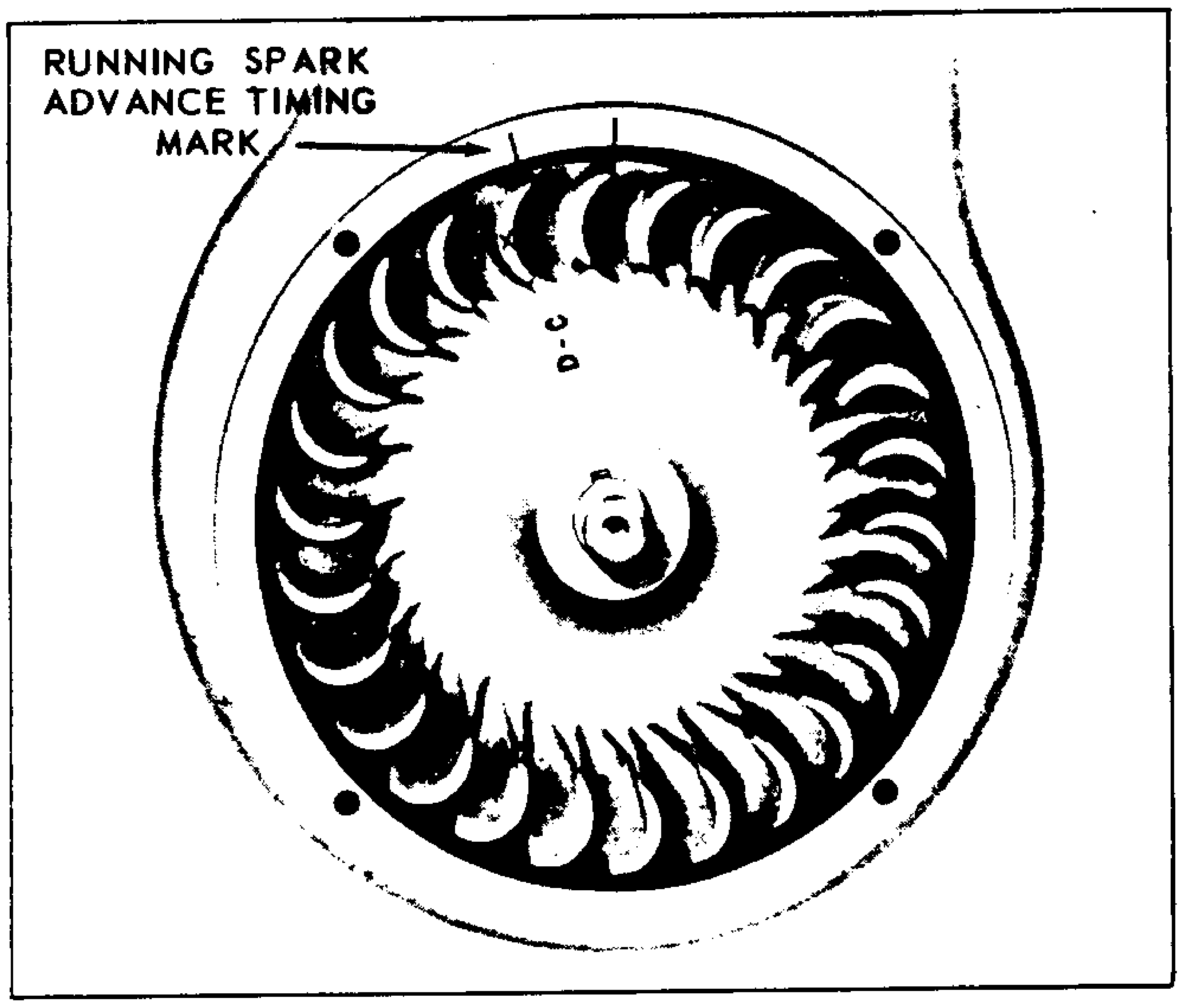


Fig. 14 208068C-1B

If the engine is running below ***2000 R.P.M.*** when timing, the automatic advance in the timer will not be in the *"full advance position"* and thus the timing would not be accurate.

GENERATOR AND TIMER MAINTENANCE

Every 50 hours of operation; add 3 to 5 drops of medium engine oil to the oiler in the generator end head.

Every 100 hours, apply 3 to 5 drops of light engine oil (10W), to the felt in the top of the cam sleeve, and 1 or 2 drops to the breaker arm pivot.

Every 200 hours, add a small amount of high melting point grease to the breaker arm rubbing block.

ELECTRICAL WIRING CIRCUIT (Fig. 13)

NOTE: Beginning with engine serial No. 3995611 the standard wiring circuits of all ***12 volt*** electrical equipment is ***negative ground polarity,*** instead of the previously furnished positive ground.

Do not use positive ground generator and regulator in a negative ground circuit, or vice versa. Polarity does not affect starting motor, coil and timer.

FLYWHEEL ALTERNATOR

12 volt – 30 amp flywheel alternator available in place of belt driven generator. Instructions and parts list are located in rear of manual.

SPARK PLUG (Fig. 15)

Incorrect gap, fouled or worn spark plug electrodes, will have an adverse affect on engine operation.

The spark plug should be removed periodically, cleaned and re-gapped, or replaced if necessary.

Spark plug gap – .030 of an inch.

Replacement plug must be of the correct heat range, like Champion No. D-21, threadsize 18 mm. Use a new gasket when mounting either old or new plug and thoroughly clean threads in cylinder head. Tighten spark plug ***25*** to ***30 foot pounds torque***.

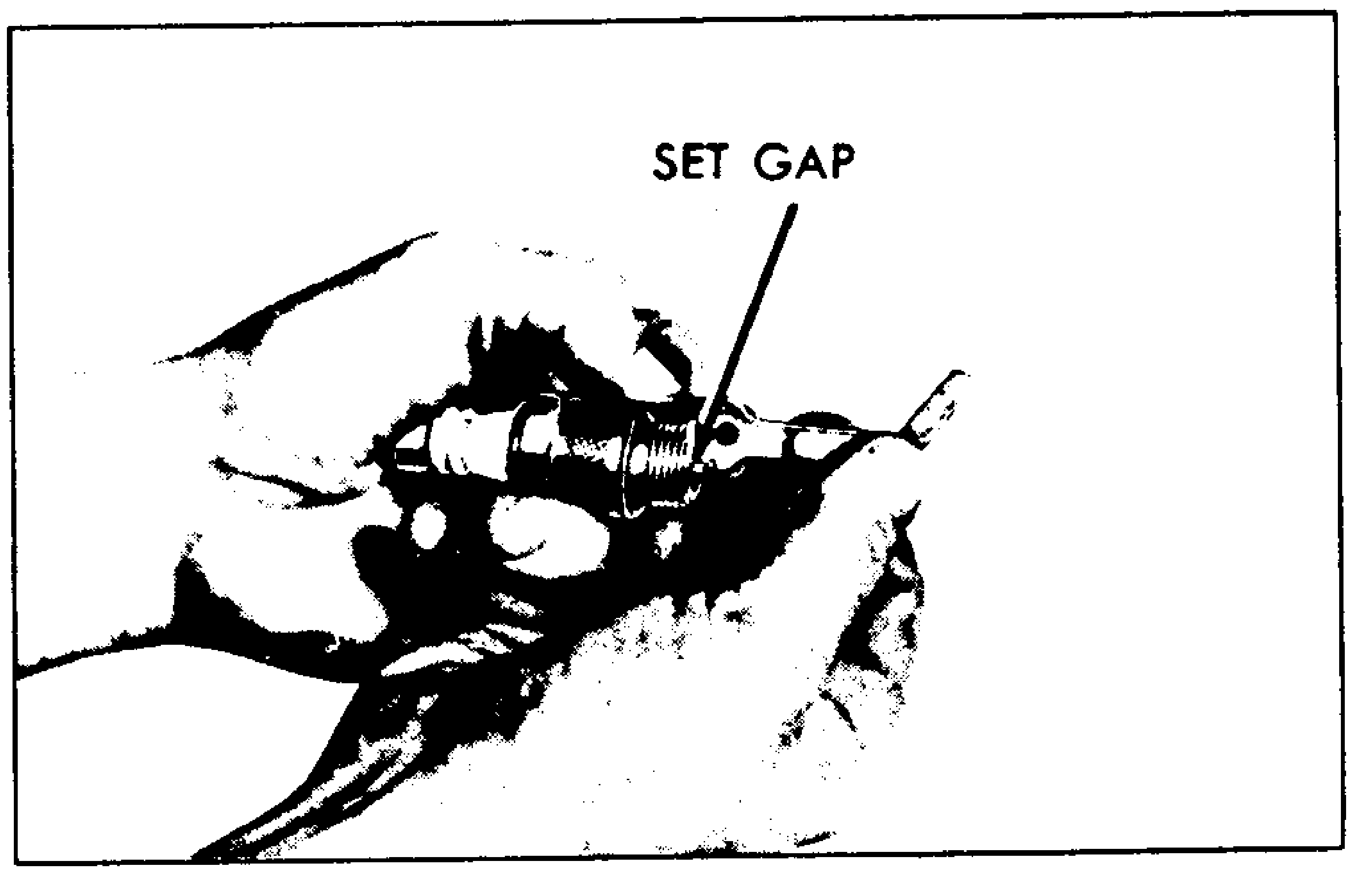


Fig. 15 104713C

RESTORING COMPRESSION

In a new engine or one which has been out of operation for some time, oil may have drained off the cylinder so that compression will be weak, causing difficulty in starting. To remedy this condition, remove spark plug and pour about a fluid ounce of crankcase oil through the spark plug hole. Turn engine over several times with the hand crank to distribute oil over the cylinder walls. Assemble spark plug and compression should be satisfactory.

HIGH TEMPERATURE SAFETY SWITCH

As a safety precaution against overheating, engines can be equipped with a high temperature switch, mounted to the cylinder head bolt opposite the spark plug, toward the take-off end.

When cylinder head temperature becomes critically high, the safety switch will automatically stop the engine by shorting out the ignition system. A waiting period of about ***10 minutes*** will be required before the switch has cooled off sufficiently to re-start the engine. An overheated engine will score the cylinder walls, burn out connecting rod and crankshaft bearings, also warp piston and valves. The cause of the overheating condition will have to be remedied before the engine is re-started. *See* ***Engine Overheats*** *paragraph in Troubles, Causes and Remedies section.*

A ***service kit,*** YC-66-D-S1, is available for installation on engines in the field.

TROUBLES
CAUSES AND REMEDIES

Three prime requisites are essential to starting and maintaining satisfactory operation of gasoline engines. They are:

1. ***A proper fuel mixture*** in the cylinder.
2. ***Good compression*** in the cylinder.
3. ***Good spark, properly timed,*** to ignite the mixture.

If all three of these conditions do not exist the engine cannot be started. There are other factors which contribute to hard starting; such as too heavy a load for the engine to turn over at low starting speed, a long exhaust pipe with high back pressure, etc. These conditions may affect starting, but do not necessarily mean the engine is improperly adjusted.

As a guide to locating any difficulties which might arise, the following causes are listed under the three headings: ***Fuel Mixture, Compression,*** and ***Ignition.*** In each case the causes of trouble are given in the order in which they are most apt to occur.

STARTING DIFFICULTIES

FUEL MIXTURE

No fuel in tank, shut-off closed or cap vent plugged.

Fuel pump diaphragm worn out or damaged.

Carburetor not choked sufficiently, especially if engine is cold. See *'Starting Procedure', Page 7.*

Water, dirt, or gum in gasoline interfering with free flow of fuel to carburetor.

Poor grade or stale gasoline that will not vaporize sufficiently to form the proper fuel mixture.

Carburetor flooded, caused by too much choking especially if engine is hot. See *'Starting Procedure'.*

Dirt or gum holding float needle valve in carburetor open. This condition will be indicated if fuel continues to drip from carburetor with engine standing idle. Often tapping the float chamber of the carburetor very lightly will remedy this trouble. Do not strike carburetor with any metal tool.

If due to flooding, too much fuel entered the cylinder in attempting to start the engine, the mixture will most likely be too rich to burn. In that case the spark plug should be removed and, with choke open, the engine should be turned over several times with the starting crank - so the rich mixture will be blown out through the spark plug hole. Spark plug should be dried off, assembled, and starting tried again.

To test for clogged fuel line, loosen fuel line fitting at carburetor slightly. If line is open, fuel should drip out at loosened nut.

COMPRESSION

Beginning with engine Serial No. 4394816, this model of engine was provided with an ***automatic compression release,*** so that the normal method of detecting faulty compression, by the resistance encountered when turning the engine over on the compression stroke, no longer holds true.

Check the following for suspected lack of compression, if the ***fuel*** and ***ignition systems*** are not the cause of starting difficulties and loss of power.

Cylinder dry due to engine being out of use for some time. *See 'Restoring Compression', Page 12.*

Loose or broken spark plug. In this case a hissing noise will be heard in cranking engine due to escaping gas mixture on compression stroke.

Damaged cylinder head gasket or loose cylinder head. This will likewise cause hissing noise on compression stroke.

Valve tappets with insufficient clearance under valve stems. *See 'Tappet Adjustment', Page 19.*

If correcting the above conditions does not remedy the situation, it will be necessary to partially dismantle the engine and check for:

Valve stuck open due to carbon or gum on valve stem. To clean valve stems, *see 'Valves', Page 16.*

Piston rings stuck in piston due to carbon accumulation. This will require removing piston and connecting rod assembly and cleaning parts. *See 'Piston and Connecting Rod', Page 17.*

Scored cylinder. This will require reboring of the cylinder and fitting with new piston and rings. If scored too severely, an entirely new cylinder block may be necessary.

IGNITION

See 'Magneto Ignition Spark', Page 10, or 'Battery Ignition Timing', Page 11. No spark may also be attributed to the following:

Ignition cable disconnected from magneto, timer, coil or spark plug.

Broken ignition cables, causing short circuits.

Ignition cable wet or oil soaked.

Spark plug insulator broken. Spark plug wet or dirty.

Spark plug point gap wrong. *See Page 12.*

Condensation on spark plug electrodes.

Magneto or timer breaker points pitted or fused.

Magneto or timer breaker arm sticking.

Magneto or timer condenser leaking or grounded.

Spark timing wrong. *See 'Magneto Timing', Page 10, or 'Battery Ignition Timing', Page 11.*

ENGINE MISSES

Spark plug gap incorrect. *See Page 12.*

Worn and leaking ignition cable.

Weak spark. *See 'Magneto Ignition Spark', Page 10, or 'Battery Ignition Timing', Page 11.*

Loose connections at ignition cable.

Magneto or timer breaker points pitted or worn.

Water in gasoline.

Poor compression. *See 'Compression', Page 13.*

ENGINE SURGES OR GALLOPS

Carburetor flooding.

Governor spring hooked into wrong hole in lever, or governor rod incorrectly adjusted. *See 'Governor Adjustment', Page 19.*

ENGINE STOPS

Fuel tank empty. Water, dirt or gum in gasoline.

Gasoline vaporized in fuel lines due to excessive heat around engine (Vapor Lock). *See 'Stopping Engine', Page 8.*

Vapor lock in fuel lines or carburetor due to using winter gas (too volatile) in hot weather.

Air vent hole in fuel tank cap plugged. Engine scored or stuck due to lack of oil.

Ignition troubles. *See 'Ignition', Page 14.*

ENGINE OVERHEATS

Crankcase oil supply low. Replenish immediately.

Ignition spark timed wrong. *See 'Magneto Timing', Page 10, or 'Battery Ignition Timing', Page 11.*

Low grade of gasoline. Engine overloaded.

Restricted cooling air circulation.

Part of air shroud removed from engine.

Dirt between cooling fins on cylinder head.

Engine operated in confined space where cooling air is continually recirculated, consequently becoming too hot.

Carbon in engine. Restricted exhaust.

Dirty or incorrect grade of crankcase oil.

Engine operated while detonating due to low octane gasoline or heavy load at low speed.

ENGINE KNOCKS

Poor grade of gasoline or of low octane rating. *See 'Fuel', Page 7.*

Engine operating under heavy load at low speed.

Carbon or lead deposits in cylinder head.

Spark advanced too far. *See 'Magneto Timing', Page 10, or 'Battery Ignition Timing', Page 11.*

Loose or burnt out connecting rod bearing.

Engine overheated due to causes under previous heading.

Worn or loose piston pin.

ENGINE BACKFIRES THROUGH CARBURETOR

Water or dirt in gasoline. Poor grade of gasoline.

Sticky inlet valve. *See 'Valves', Page 16.*

Engine cold. Overheated valves.

Spark plug too hot. *See 'Spark Plug', Page 12.*

Hot carbon particles in engine.

DISASSEMBLY AND REASSEMBLY OF ENGINE

Engine repairs should be made only by a mechanic who has had experience in such work. When disassembling the engine, it is advisable to have several boxes available so that parts belonging to certain groups can be kept together, such as, for instance, the cylinder head screws, etc. Capscrews of various lengths are used in the engine, therefore great care must be exercised in reassembly so the right screw will be used in the various places, otherwise damage may result.

Tighten the capscrews or nuts of the manifold, cylinder head, engine base, connecting rod, main bearing plate and the spark plug to the specified torque readings indicated in the following paragraphs of reassembly.

While the engine is partly or fully dismantled, all of the parts should be thoroughly cleaned. Remove all accumulated dirt from between the fins.

If it is desired to disassemble the engine, the following order should be substantially adhered to. As disassembly progresses, the order may be altered somewhat if desired, as will be self-evident to the mechanic. Reassembly of the engine should be made in the reverse order.

TESTING OF REBUILT ENGINE

An engine that has been completely overhauled, such as having the cylinder rebored and fitted with new piston, rings and valves, should go through a thorough "run-in" period before any amount of load is applied to the engine.

The engine should be started and allowed to run for about one-half hour, at about 1200 to 1400 R.P.M. without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional three and one-half to four hours.

The proper "running-in" of the engine will help to establish polished bearing surfaces and proper clearances between the various operating parts and thus add years of trouble free service to the life of your engine.

ACCESSORIES

On engines furnished with electrical equipment, clutch or reduction units, these should be removed first, if the engine is to be completely overhauled. Also remove muffler and spark plug wire.

FUEL TANK

Disconnect fuel line at fuel strainer. Remove capscrews mounting the fuel tank bracket to the crankcase. The tank and bracket assembly can be removed as a unit.

FLYWHEEL

Remove the flywheel screen from the front of the shroud. Loosen the flywheel nut with a monkey wrench or 1-3/8" open end wrench as shown in *Fig. 16.* Do not remove the flywheel nut, but unscrew it about two or three turns.

The flywheel is mounted to a taper on the crankshaft. Take a firm hold on the flywheel fins, pull outward and at the same time strike the end of the flywheel nut with an aluminum hammer. *See Fig. 17.* The flywheel will slide off the taper of the crankshaft and can be removed after the flywheel nut is removed. Striking the end of the flywheel nut instead of directly on the crankshaft will prevent serious damage to the threads at the end of the shaft. Also, do not use a hard hammer as it may ruin the crankshaft and bearings. When reassembling the flywheel, be sure the Woodruff key is in position on the shaft and that the keyway in the flywheel is lined up accurately with the key.

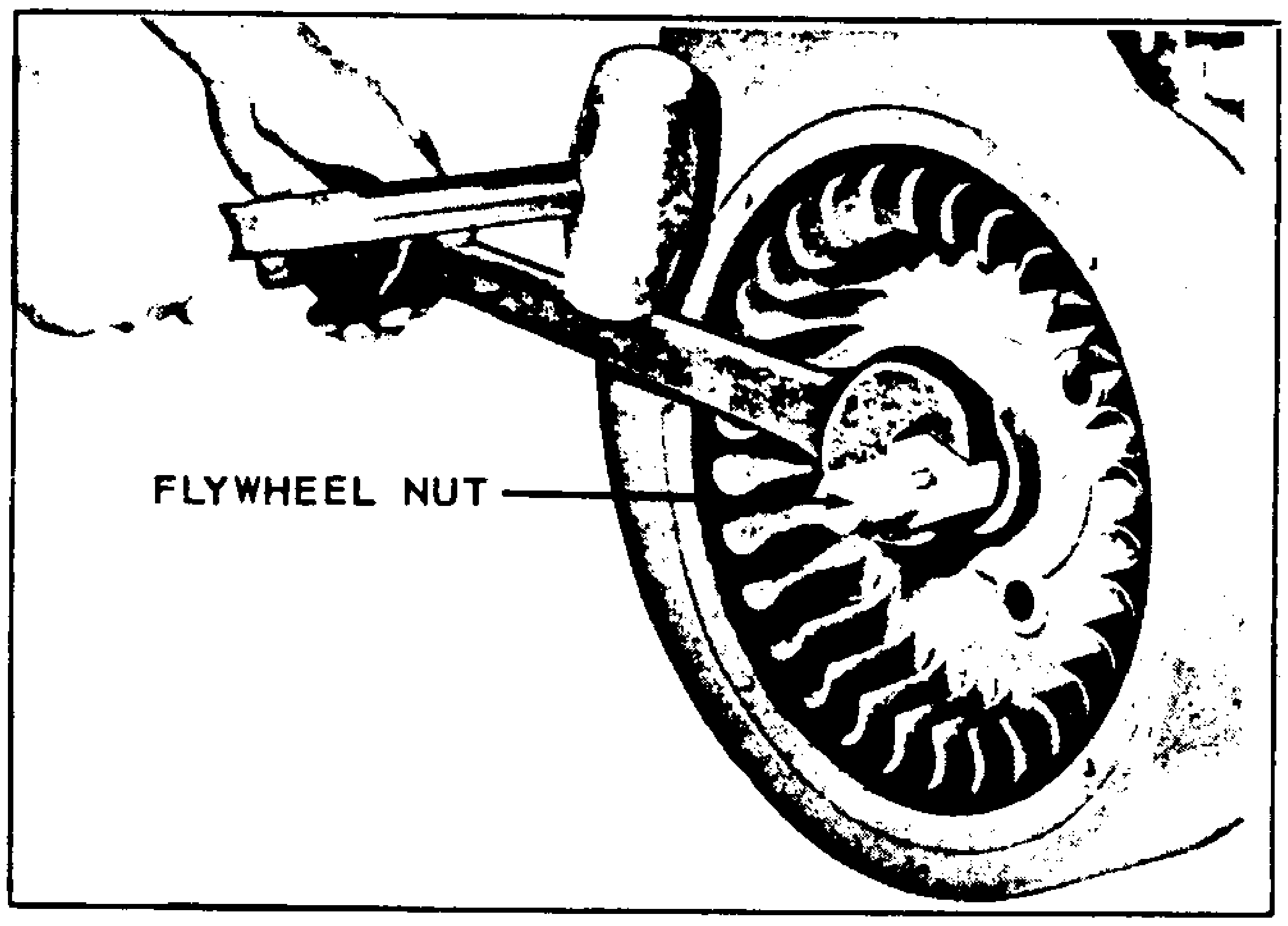


Fig. 16 148497C

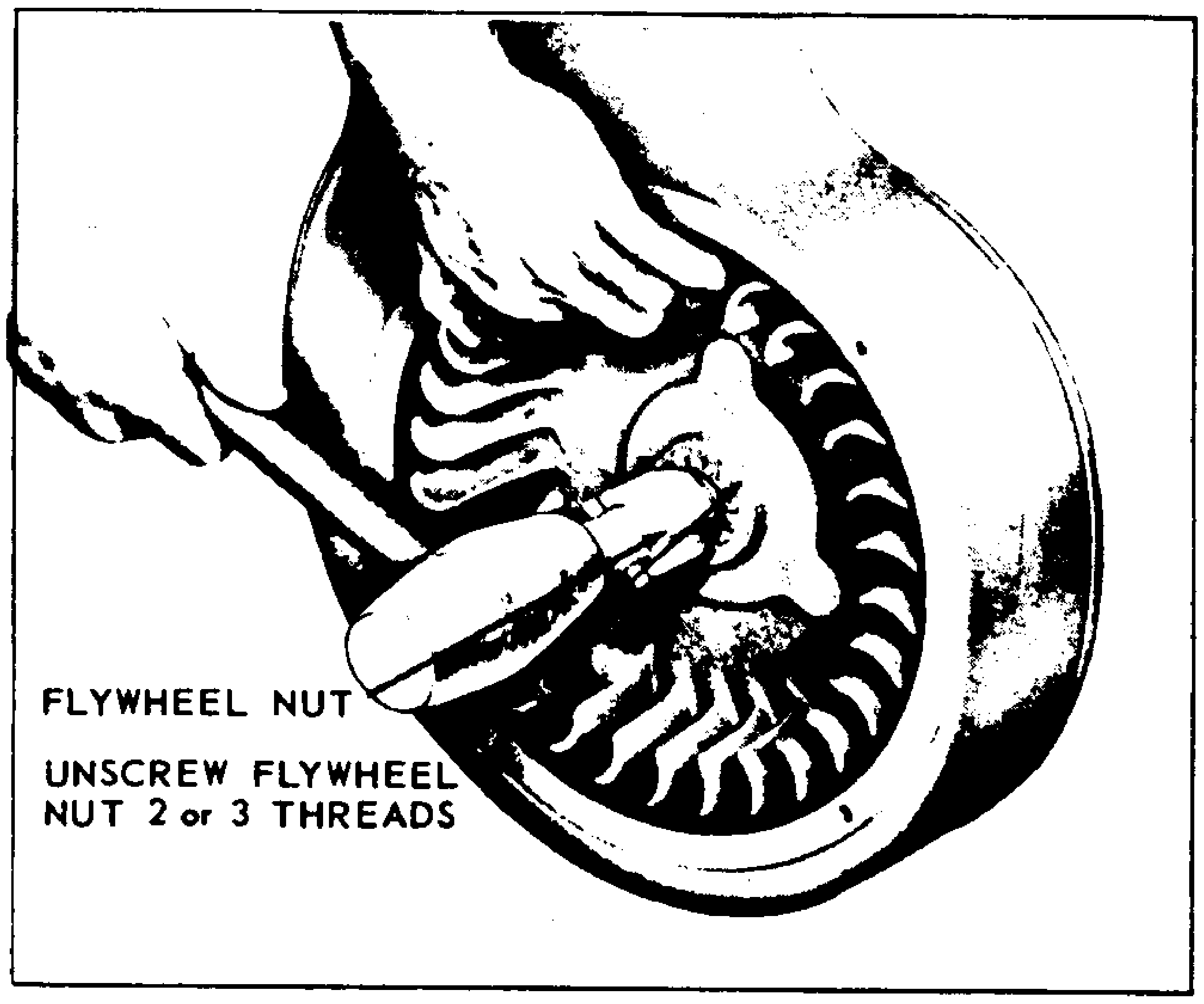


Fig. 17 189165C

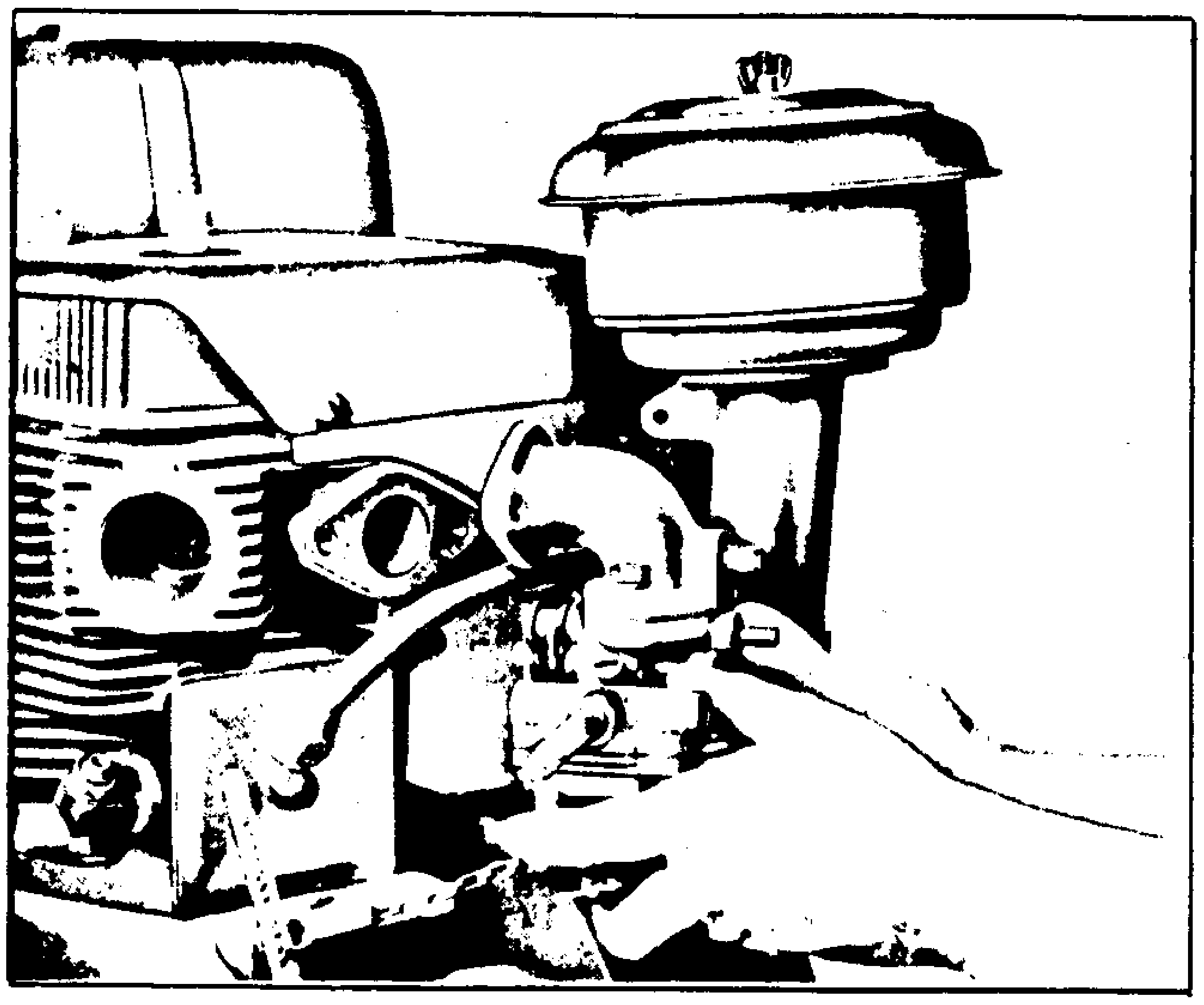


Fig. 18 231082C

CARBURETOR, MANIFOLD AND AIR CLEANER

Loosen the breather line at the cylinder block. Then, remove the cotter pin from the governor control rod and pull the rod out of the governor control lever. Loosen and remove the capscrew and lockwasher which holds the air cleaner bracket to the engine. Next, loosen and remove the 2 capscrews and lockwashers which clamp the manifold to the cylinder. The entire assembly of the manifold, carburetor and air cleaner can then be removed as a unit. *See Fig. 18.*

In reassembly, tighten the screws for mounting the manifold, 14 to 18 foot pounds torque.

AIR SHROUD

Remove round head screw and cylinder head stud nut which hold the shroud cover in place. The flywheel

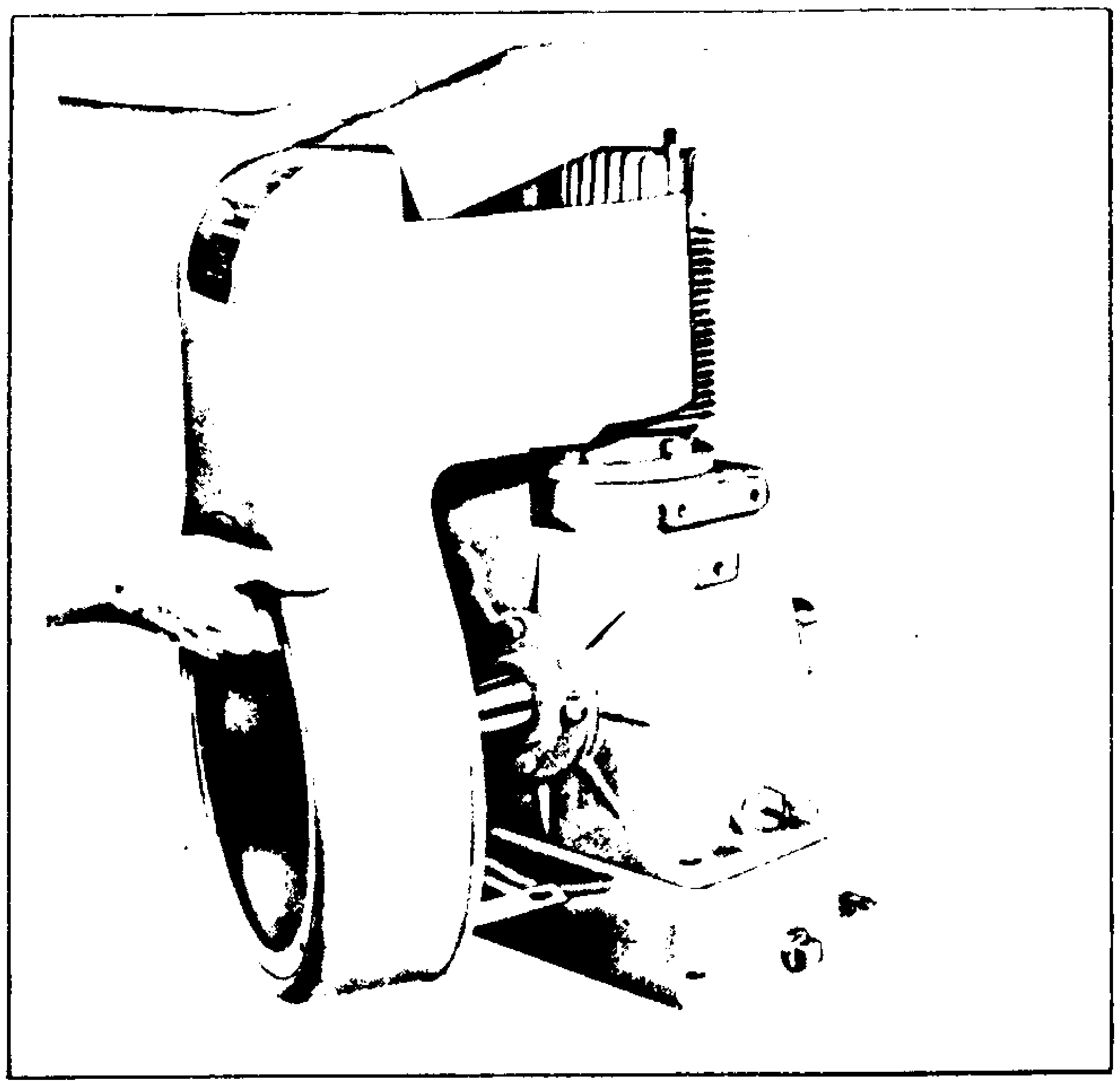


Fig. 19 231081C

shroud is held in place by two round head screws to the cylinder block and head, and two cap screws mounting the crankcase to the engine base toward the front of the engine. Remove these screws, disconnect governor spring, and the air shroud and cover can be removed. *See Fig. 19.*

CYLINDER HEAD

The cylinder head must be removed if it is necessary to regrind valves or to do work on the piston, rings or connecting rod. All of the cylinder head bolts are plainly in view and can be easily removed. Bolts of different lengths are used but these can be properly reassembled according to the various lengths of cylinder head bosses. Before reassembling the cylinder head, all carbon and lead deposits should be removed. It is recommended that a new cylinder head gasket be used on reassembly as the old gasket will be compressed and hard, and it may not seal properly.

Tighten cylinder head screws to 32 foot pounds torque.

VALVES

Assuming that the cylinder head has already been taken off, remove valve tappet inspection plate. Compress valve springs with a standard automotive type valve lifter. We recommend a valve lifter manufactured by KD Tools of Lancaster, Penn., or equivalent. The valve spring retainer locks should then be removed from the valve stems. *See Fig. 20.* The valves can then be withdrawn from the top of the cylinder block. The valves should be cleaned of all carbon and gum deposits as well as the valve seats, ports and guides in the cylinder block.

If it is necessary to replace or regrind the valves, first grind the seats at a 45° angle. The valve face is also ground at a 45° angle. After grinding, valves and seats should be lapped with a suitable lapping compound or they will leak due to improper seating, within the first few hours of operation. After valve seats have been cleaned, apply lapping compound to the valve face and put the valves back into their guides. Lap the valves by rotating them back and forth with a reciprocating advancing valve tool. Occasionally lift the valves and reseat them in a different position to insure a uniform seat which will show entirely around the valves. After valves have been lapped in evenly, remove them from the block and wash the valves and block thoroughly with gasoline or kerosene.

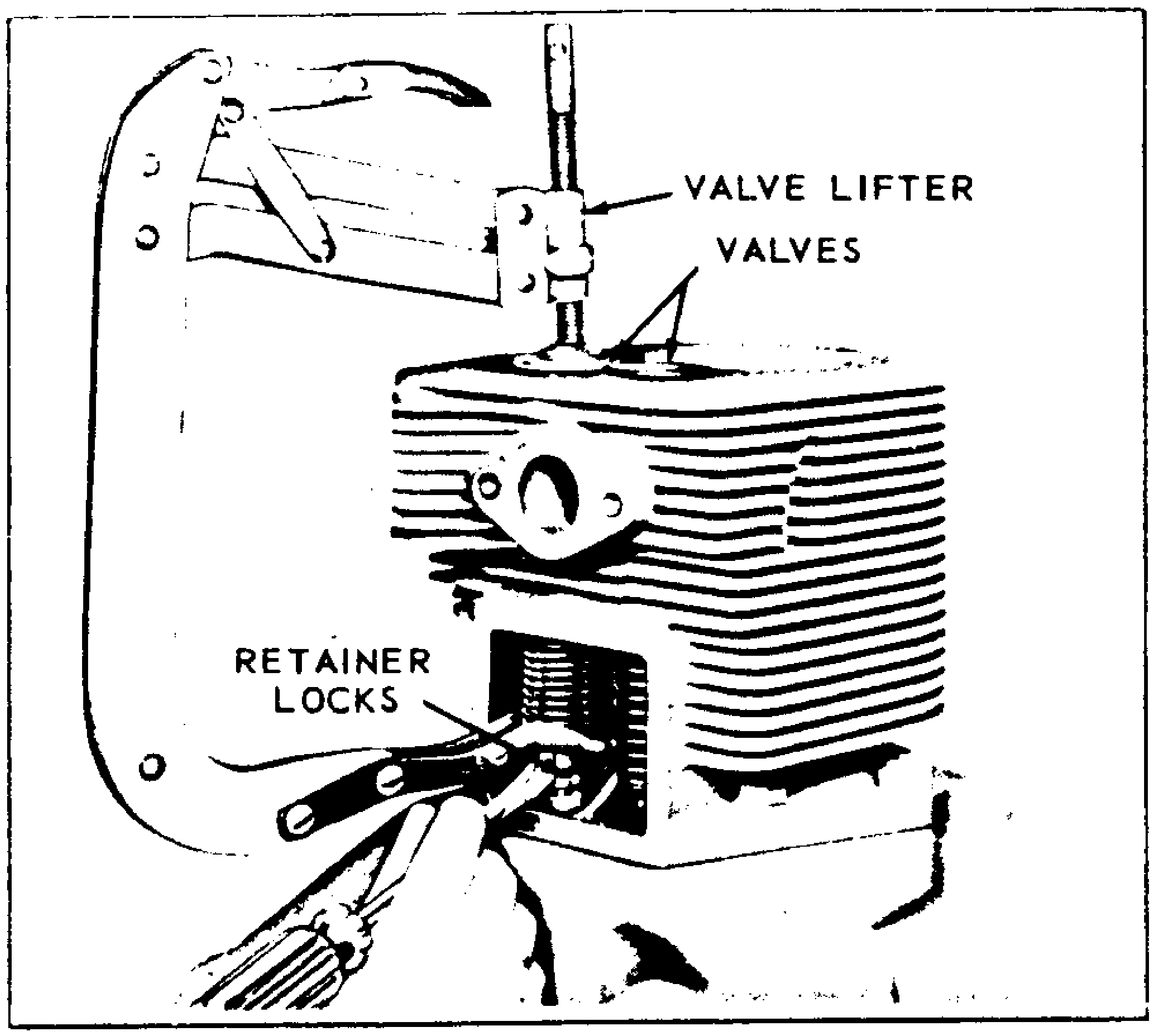


Fig. 20 231087C

The valve stems should have a clearance of .003" to .005" in the guides. When the clearance becomes .007", the worn guides should be pressed out and new guides fitted into the cylinder. Replaceable valve guides eliminate the necessity of using valves with oversize stems, as the worn guides can be driven out and replaced with new ones.

ENGINE BASE AND OIL PUMP

Be sure and drain oil from engine base. Remove the two remaining capscrews and lockwashers and lift the crankcase off the engine base.

The oil pump is part of the oil trough under the connecting rod, and the whole assembly can be removed from the oil base by removing two capscrews. If oil pump is dismantled, be sure all ball checks and other parts are reassembled in same position as when taken apart. *See Fig. 21.*

All parts of the pump should be thoroughly washed in solvent to remove all traces of thickened oil and sludge. The oil pump plunger should be fitted to the bore with a clearance of .003 to .005 inch. If the clearance is greater than .008 inch, the plunger and oil pump body should be replaced. Inspect the check ball seat in the bottom of the pump cylinder. This seat must be cleaned perfectly, and must not be worn or pitted. The check ball should be dropped into the cylinder and tapped into the seat lightly with a punch and hammer. The retainer can then be put in place and the spring lowered into the cylinder bore. Insert

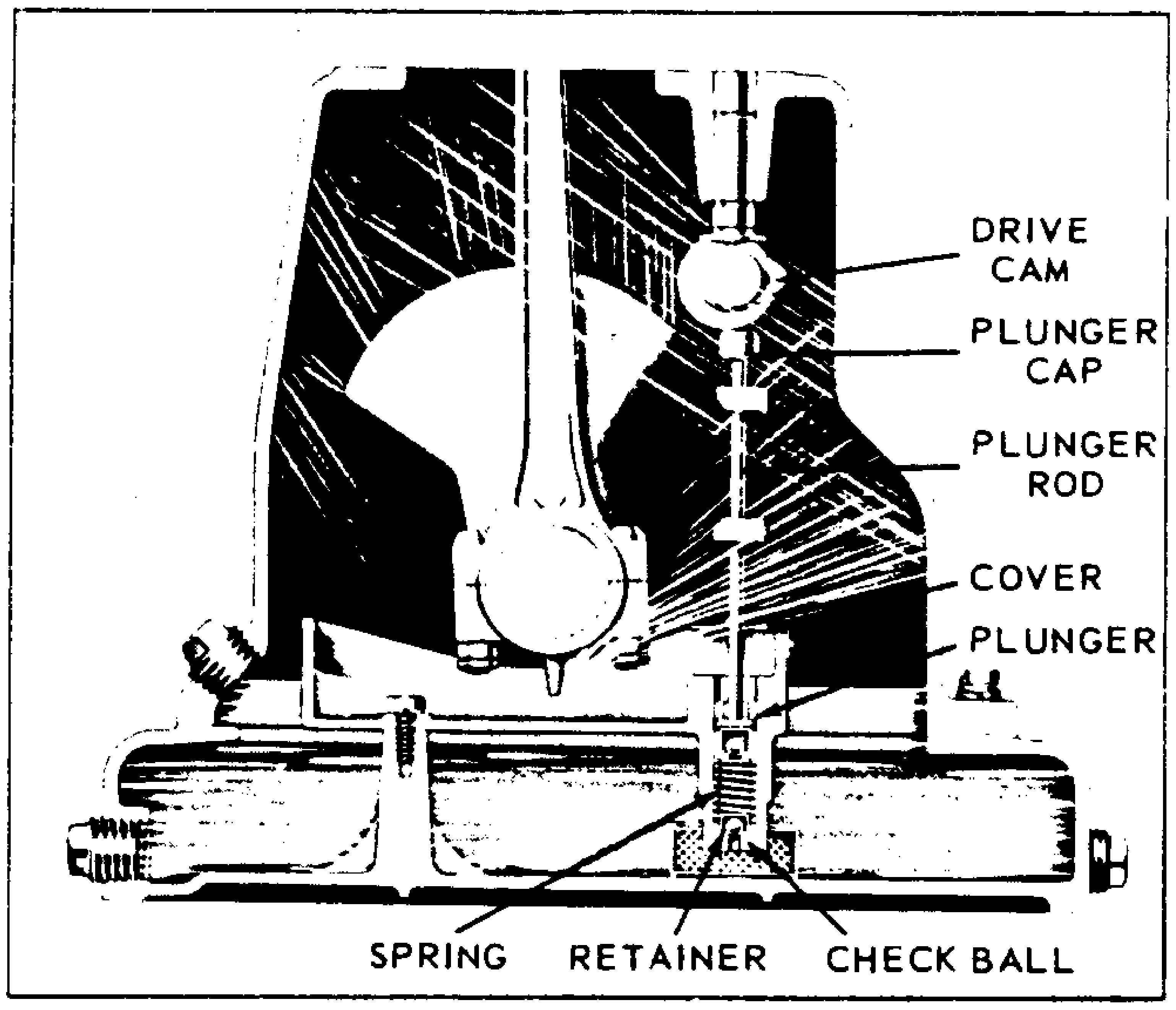


Fig. 21 232350C

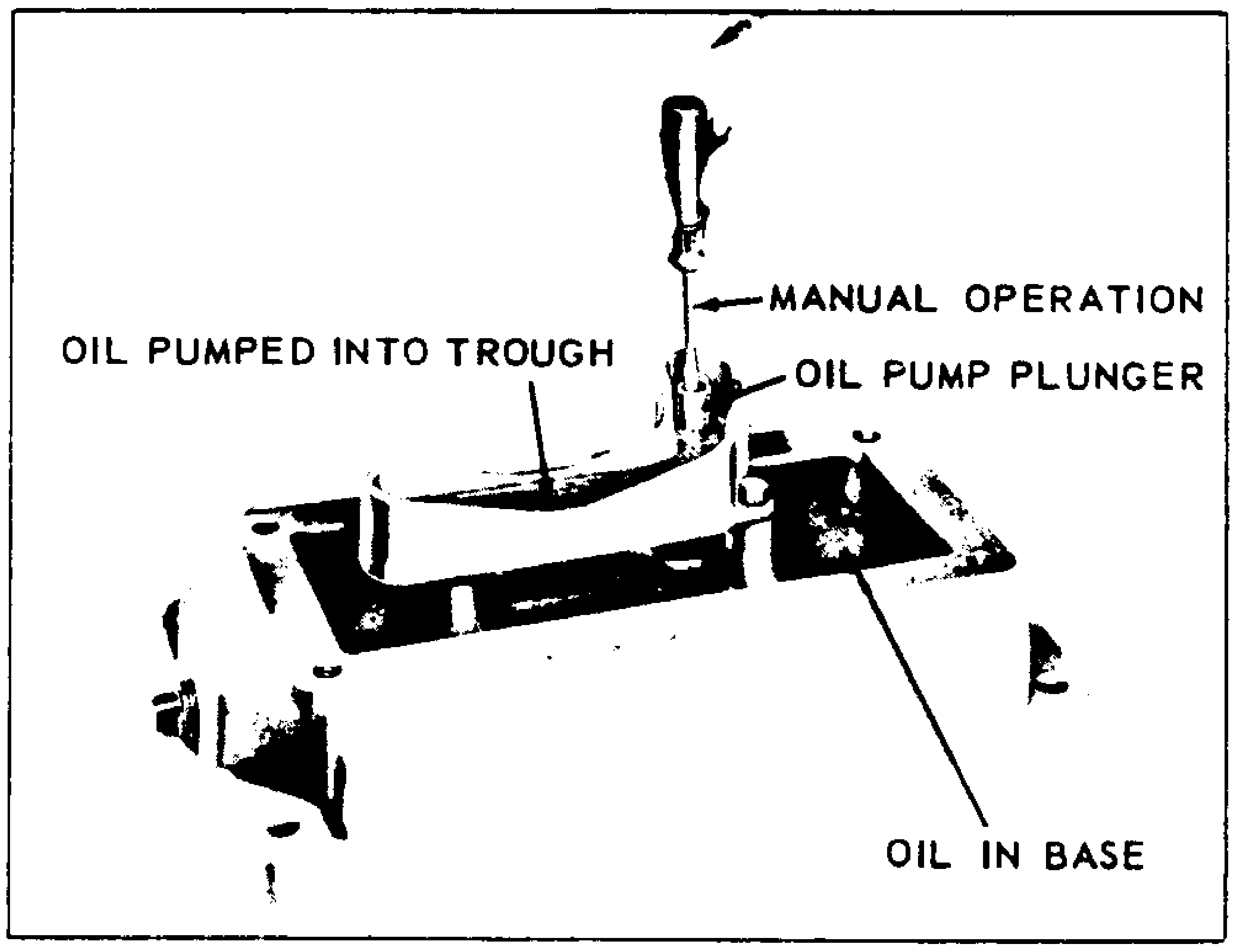


Fig. 22 231090C

plunger into bore and assemble pump cover. Add some clean engine oil to the base and test the pump by working the plunger up and down. *See Fig. 22.* If no oil is discharged into the trough, the body or plunger are worn and should be replaced.

In reassembly, use a new base gasket. In mounting the crankcase to the engine base, extreme care should be taken that the oil pump plunger rod contacts the pump plunger. Mount the two case to base capscrews and lockwashers at the take-off end. After shroud is assembled, all four engine base screws should be ***torqued 62 to 78 foot pounds.***

PISTONS AND CONNECTING RODS (Figs. 22A, 25)

By means of 9/16" socket wrench, loosen and remove the hex locknuts from connecting rod bolts. Then, by tapping the ends of the bolts lightly, the connecting rod cap will break free from the bolts.

Scrape off all carbon deposits that might interfere with removal of piston from upper end of cylinder. Turn crankshaft until piston is at top, then push connecting rod and piston assembly upward and out thru top of cylinder. Be careful not to mar the crank pin by allowing the rod bolts to strike or scrape across it.

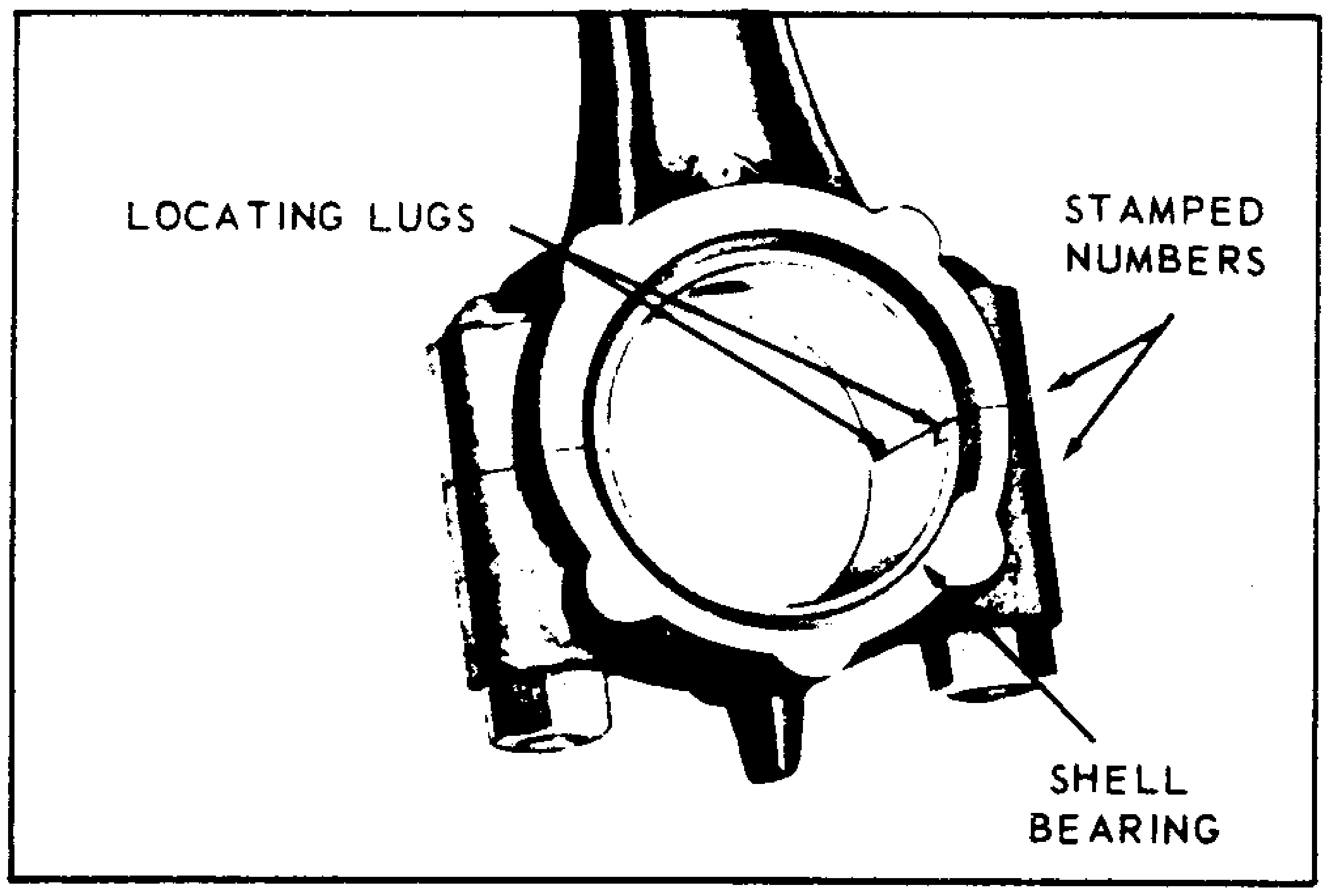


Fig. 22A 316307C

NOTE: This model of engine was originally furnished with ***babbitt cast*** connecting rod bearings. ***Shell bearing*** rods are now being used for current production engines, and are interchangeable with babbitt bearing rods for service replacement. Care should be taken ***in reassembly*** to mount bearings properly. The cap should be assembled to the rod so that the ***locating lug*** of both bearing halves are on the same side as illustrated in *Fig. 22A.* Refer to chart, *Fig. 25,* for clearance between bearing and crank pin.

The piston skirt is ***cam-ground*** to an elliptical contour. Clearance between the piston and cylinder must be measured at the center of the thrust face of the piston skirt. Refer to Chart, *Fig. 25.* The thrust faces of the piston skirt are 90° from the axis of the piston pin hole as illustrated in *Fig. 23.*

In reassembly; use a suitable ring compressor and stagger the piston ring gaps 90° apart around the piston. Oil the piston rings, wrist pin, rod bearings and cylinder walls before assembly.

CAUTION: Identical numbers are stamped on the side of the rod with its corresponding cap. These numbers must be on the same side of the connecting rod when mounted in engine. Be sure that ***oil hole*** in connecting rod cap is facing ***toward the camshaft side*** of engine. ***Install new nuts*** on connecting rod bolts and ***torque 26*** to ***32 foot pounds.***

PISTON RINGS (Fig's. 23 and 24)

If an expander tool is not available, install rings by placing the open end of the ring on piston first. Spread ring only far enough to slip over piston and into correct groove, being careful not to distort ring. Assem-

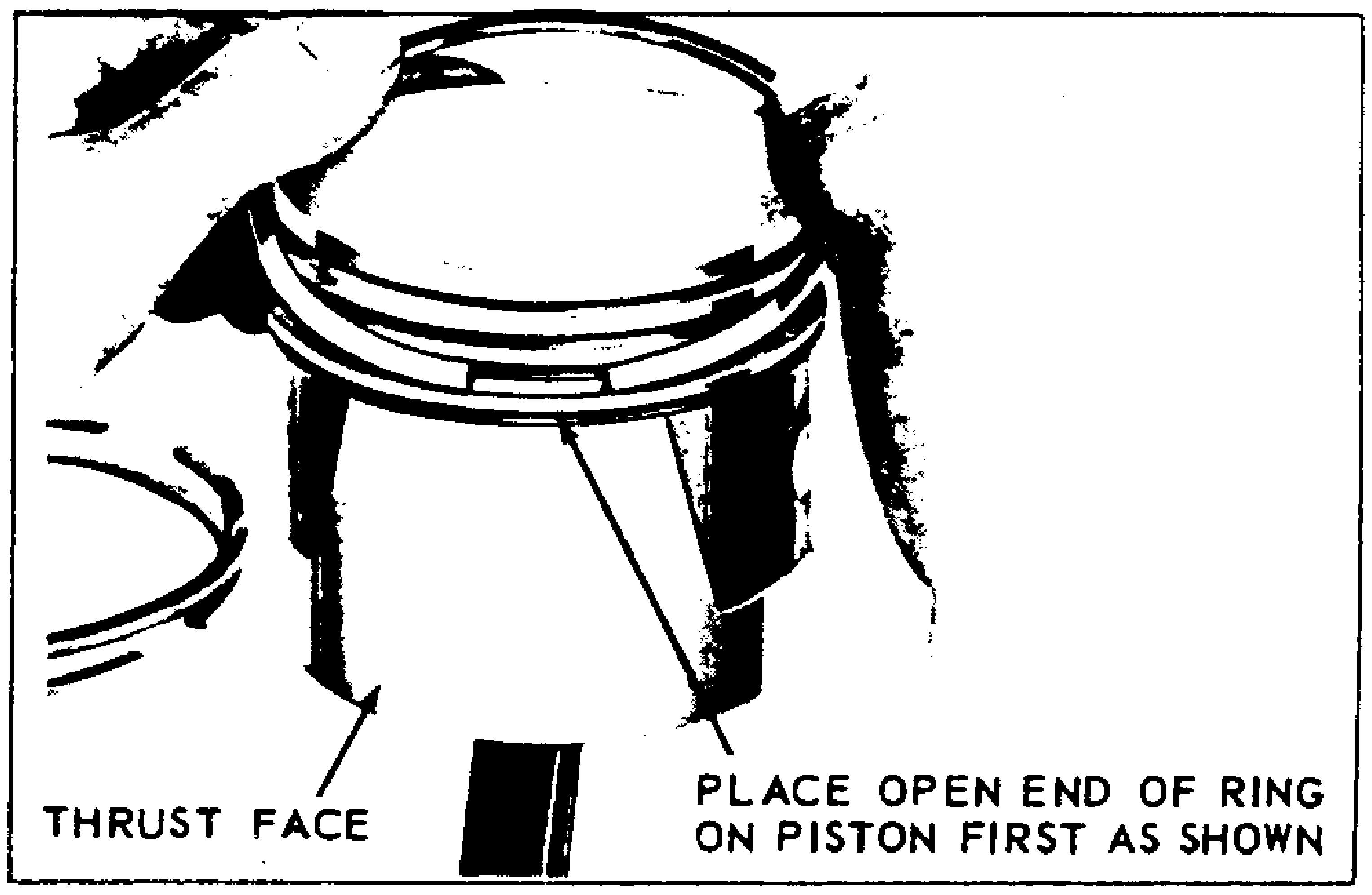


Fig. 23 71152C

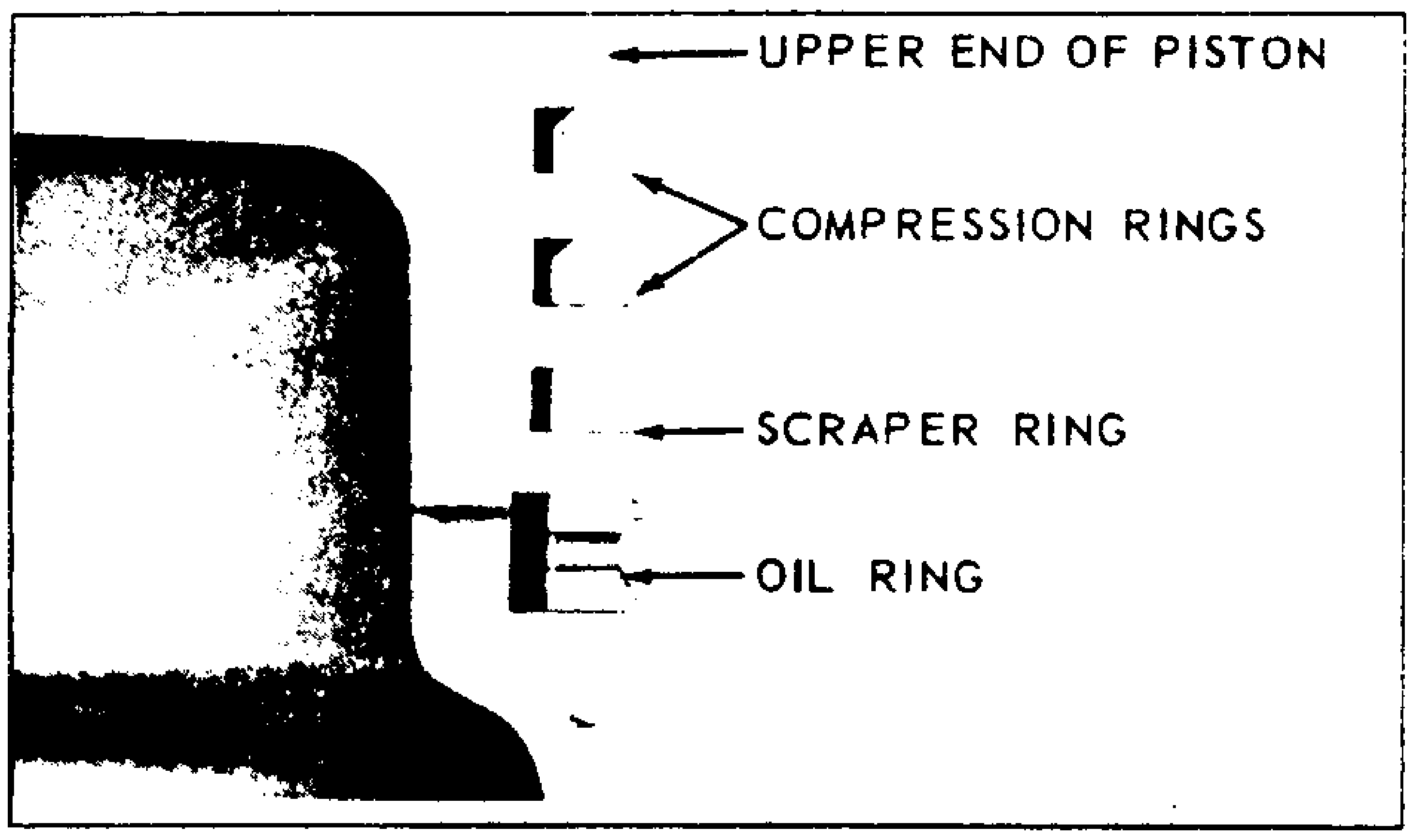


Fig. 24 92200C-1A

CYLINDER BORE		3.5005 to 3.4995"
PISTON TO CYLINDER AT PISTON SKIRT THRUST FACES		.0035"
PISTON RING GAP		.010 to .024"
PISTON RING SIDE CLEARANCE IN GROOVES	TOP RING 2ND and 3RD RINGS	.0015 to .003"
	OIL RING	.0025 to .004"
PISTON PIN TO CONNECTING ROD BUSHING		.0005 to .0011"
PISTON PIN TO PISTON		.0000 to .0008" tight
CONNECTING ROD TO CRANK PIN – SIDE CLEARANCE		.009 to .018"
CONNECTING ROD **SHELL BEARING** TO CRANK PIN DIA. (VERTICAL)		.0012 to .0035"
CONNECTING ROD **BABBITT BEARING** TO CRANK PIN		.0007 to .0020"

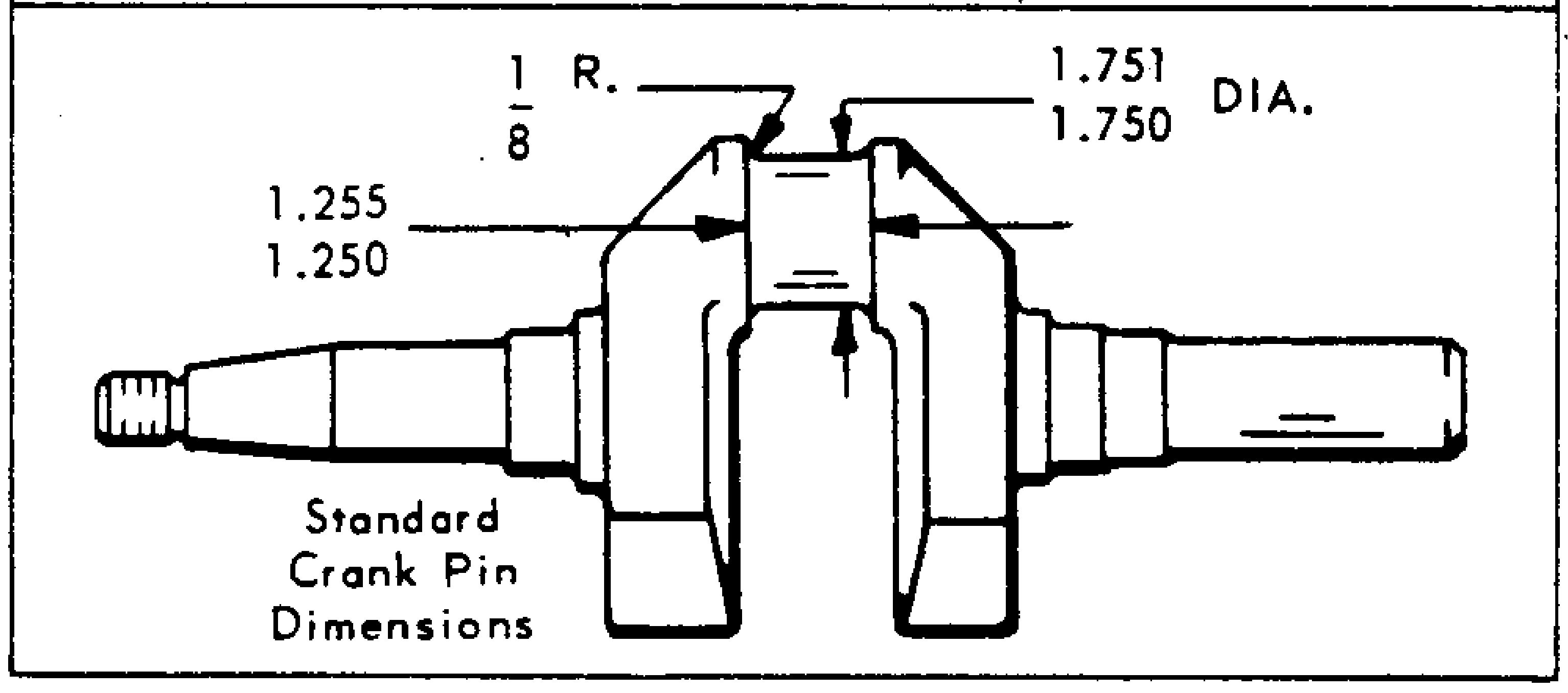


Fig. 25 **PISTON, RING AND ROD CLEARANCES CHART**

ble bottom ring first and work upward, installing top ring last. Mount scraper ring with scraper edge down, otherwise oil pumping and excessive oil consumption will result. Refer to *Fig. 24* for correct placement.

CYLINDER BLOCK

Clean all dirt and foreign deposits from between the cylinder block fins. The cylinder block does not have to be removed, unless the cylinder bore is worn more than .005 inch oversize. In this case, the block should be reground and fitted with oversize piston and rings.

In reassembly; tighten the four cylinder block mounting nuts, ***40*** to ***50 foot pounds torque.***

CRANKSHAFT (Fig's. 26 and 27)

To remove crankshaft, take out the four main bearing plate capscrews at take-off end. The plate can then be pried off and the crankshaft removed from that end of engine.

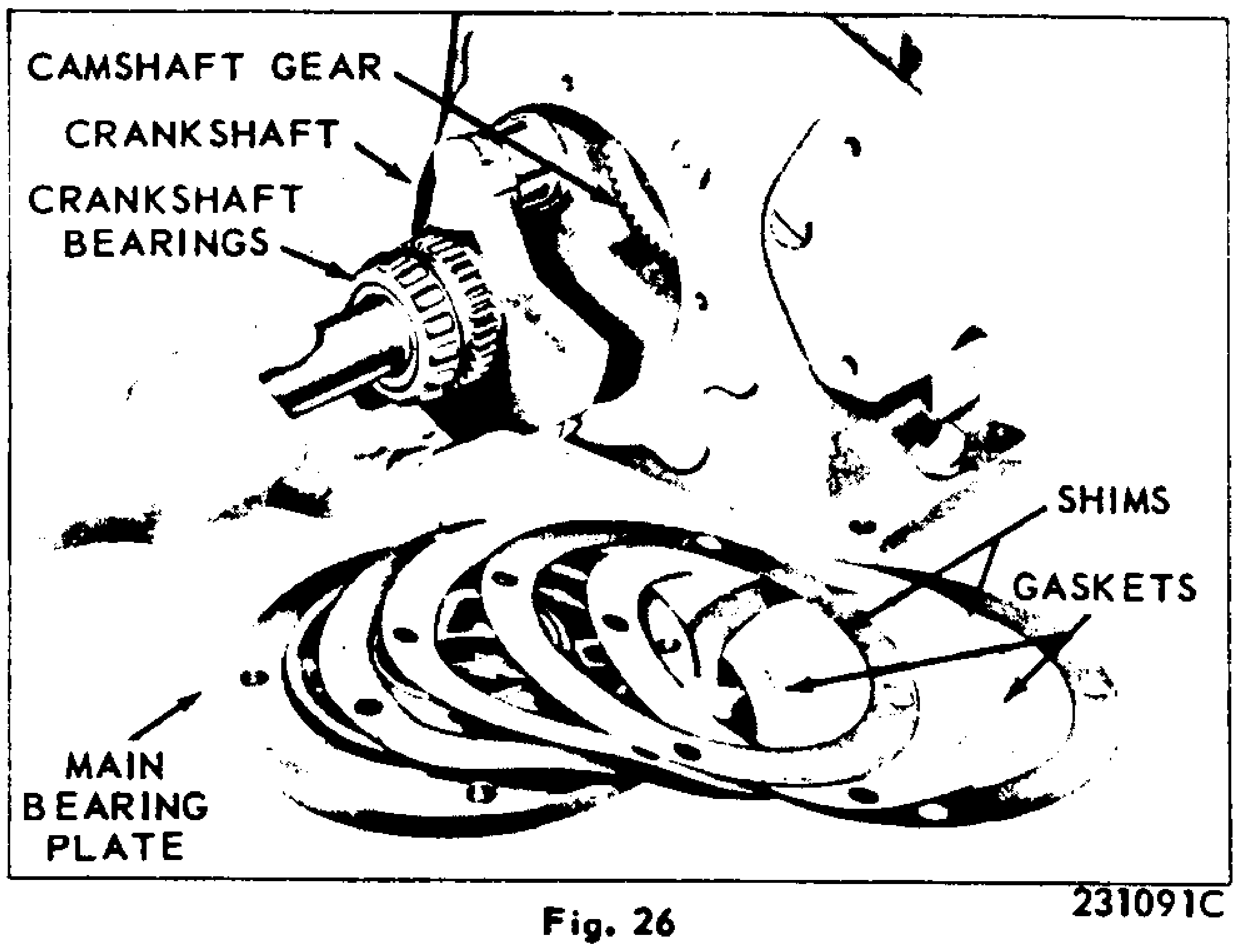


Fig. 26 231091C

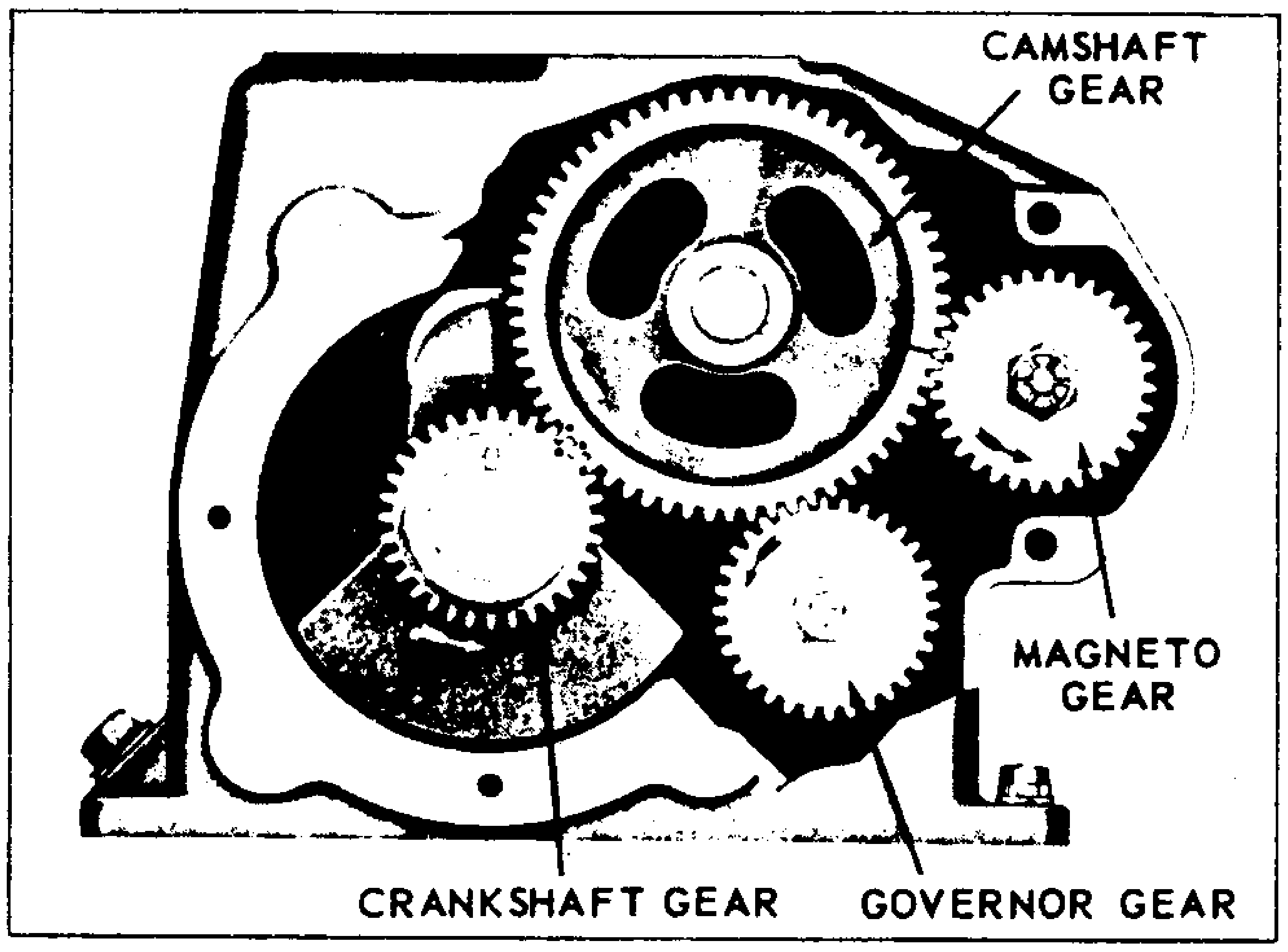


Fig. 27 232239C

In reassembly; use same quantity and thickness of new bearing plate gaskets and shims as were removed, since these are necessary to obtain the proper end play for the tapered roller crankshaft bearings. ***End play*** should be ***.002*** to ***.005*** inch when engine is ***cold.*** There is practically no wear in these bearings so that readjustment is seldom necessary.

CAUTION: When mounting crankshaft, the ***timing marks*** on crankshaft and camshaft gears must match up, *Fig. 27,* otherwise engine will not operate properly or if timing is off considerably, will not run at all.

The word ***"top"*** is cast on the outside of the main bearing plate, and should be mounted in this position to maintain proper lubrication to the main bearing. Tighten main bearing plate capscrews, ***20*** to ***22 foot pounds torque.***

CAMSHAFT AND VALVE TAPPETS (Fig. 28)

The camshaft rotates on a stationary pin in the crankcase and can be taken out after the crankshaft is removed. Use a brass drift punch and ***drive*** support pin ***from take-off end*** of crankcase, out thru opposite end as illustrated.

In reassembly; the camshaft support pin must be ***driven*** through the case ***from the flywheel end*** of the engine, and after tappets are assembled. The tappets are fitted to the guide holes in crankcase with a clearance of ***.0005*** to ***.0025*** inch. The

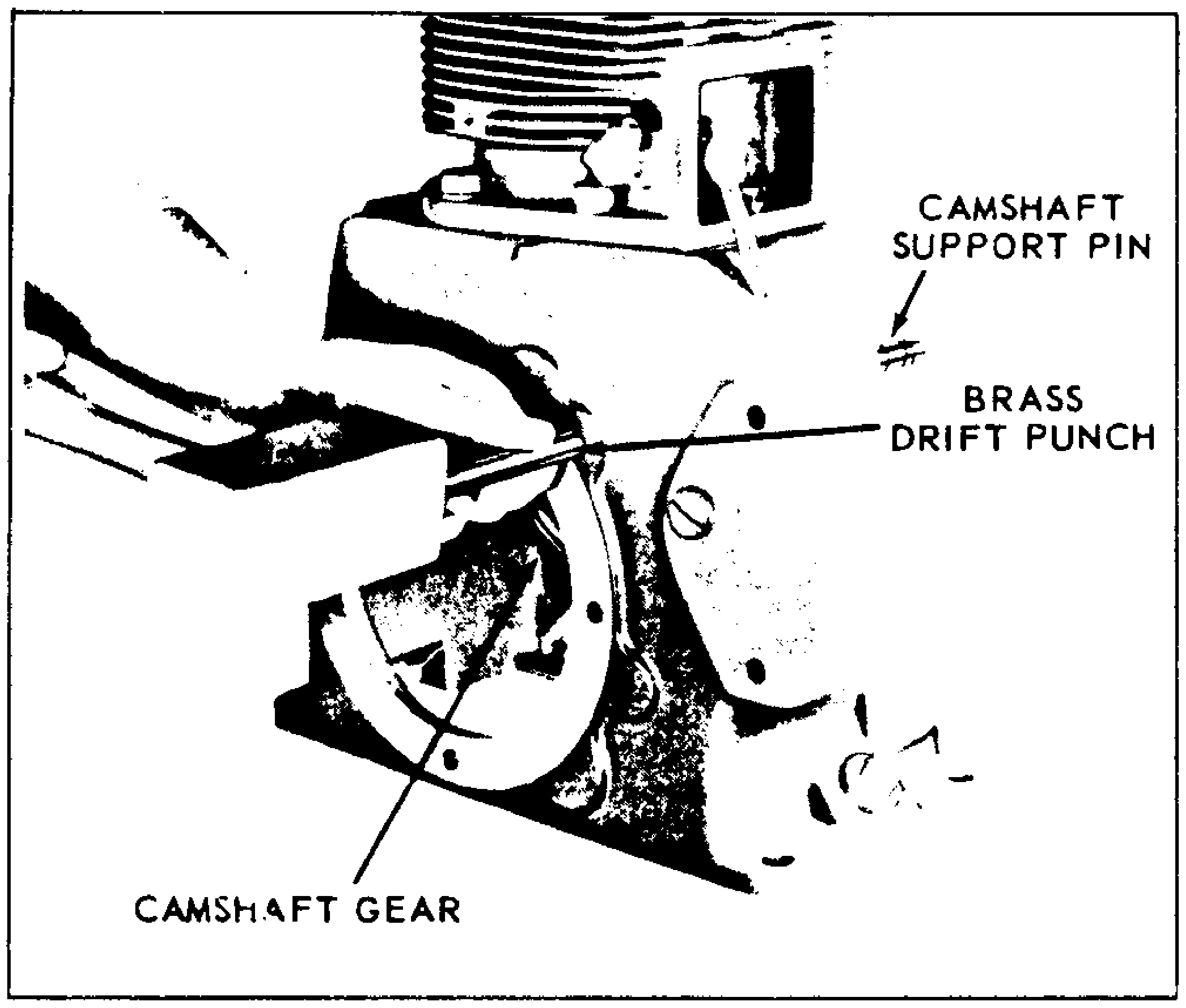


Fig. 28 231085C

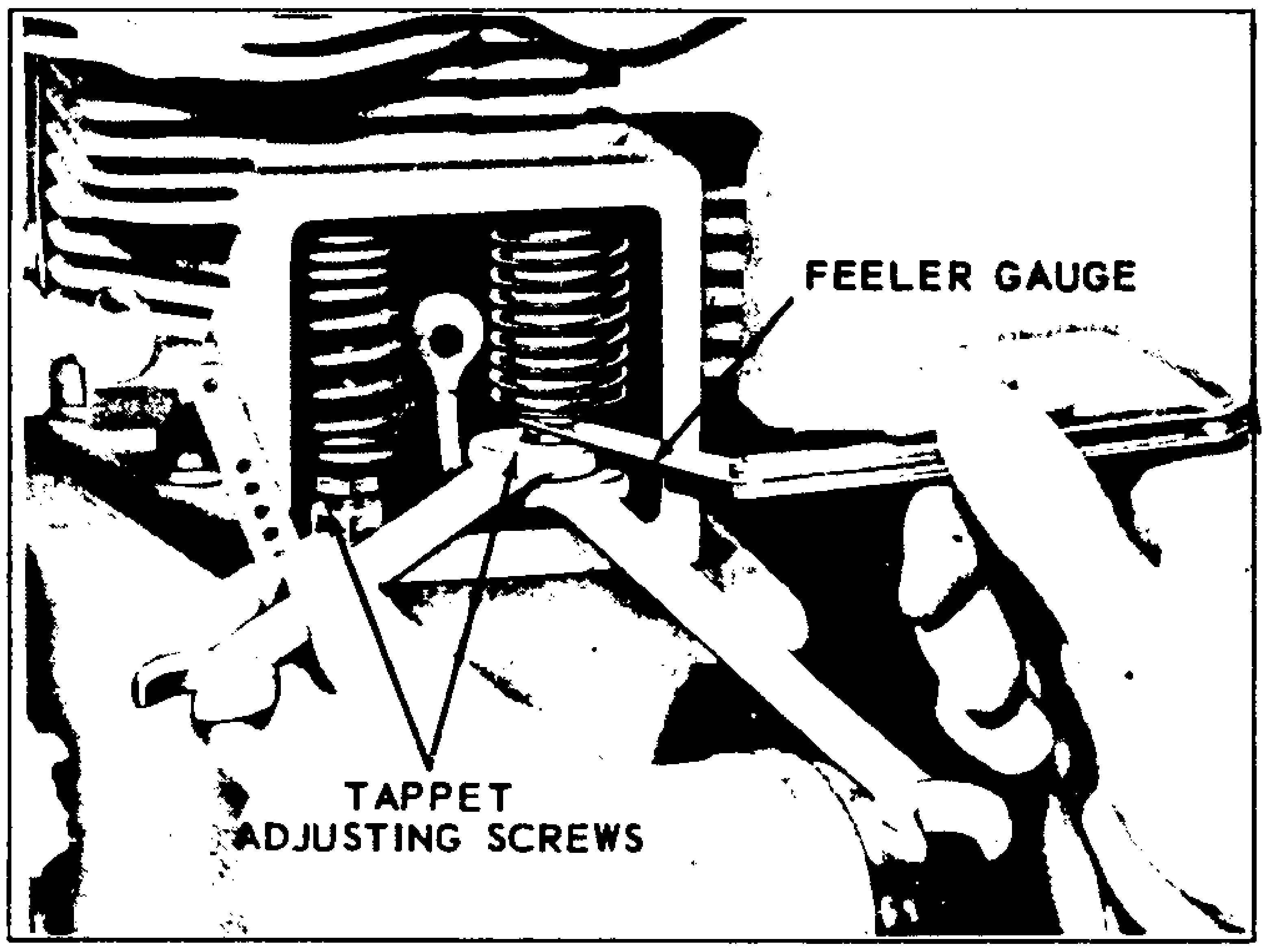


Fig. 29 231088C

support pin is fitted to the camshaft with a clearance of .001 to .0025 inch. Replace the camshaft plug on the flywheel end to seal in the support pin.

VALVE TAPPET ADJUSTMENT

Adjust the valve tappets as shown in *Fig. 29.* With the tappets in their lowest positions, engine cold, the clearance should be:

Inlet – .008 inch, ***Exhaust*** – .016 inch.

GOVERNOR

To facilitate the removal of the governor assembly, remove the governor stop pin which is screwed in thru the front face of the crankcase. The entire governor gear and flyweight assembly can be withdrawn from the stationary governor shaft. In reassembly, the gear bushing in the governor assembly is fitted to the governor shaft with a clearance of .0015 to .0025 inch. When clearance becomes .006 inch, replace bushing. Refer to Sectional Drawing of engine, *Fig. 2,* for construction of governor.

The centrifugal flyball governor rotates on a stationary pin inside the crankcase and is driven off the camshaft gear at crankshaft speed.

The flyweights are hinged to lugs on the gear. Hardened pins on the flyweights bear against the flanged sliding sleeve, moving it back and forth as the flyweights move in or out. The motion of the sleeve is transmitted through a thrust bearing to the governor lever, which in turn is connected to the carburetor throttle lever. A spring connected to the governor lever tends to hold the flyweights to their inner position, also to hold the carburetor throttle open. As the engine speed increases, the centrifugal force in the flyweights acts against the spring and closes the throttle to a point where the engine speed will be maintained practically constant under varying load conditions. This speed can be varied to suit conditions by the governor spring adjusting screw. Refer to *'Correct Engine Speed'* paragraph for this adjustment.

GOVERNOR ADJUSTMENT

The control rod between the governor and carburetor must be adjusted to the proper length otherwise the governor action will be faulty. The accuracy of this adjustment can be tested by disconnecting the control rod from the governor lever, and then pushing the rod toward the carburetor as far as it will go. This will open the throttle wide. The governor lever should then be moved as far as possible in the same direction, all of this being done with the rod disconnected from the lever. Holding both parts in the above position, the rod should be screwed into the swivel block on the carburetor, until the bent end of the rod will register with the hole in the lever, *(See Fig. 30),* then, screw the rod in two more turns. Insert the rod into the hole in the governor lever. With the governor lever pushed toward the carburetor as far as it will go, there should be about a 1/16 inch clearance between the throttle lever and the stop pin on the carburetor. The clearance will cause the lever to bounce back from the stop pin, rather than jam against the pin, when a load is suddenly applied to an idling engine. This will eliminate excessive wear on the threads in the carburetor throttle swivel block.

CORRECT ENGINE SPEED

On this model of engine, three different governor springs are required to give the full range of speeds.

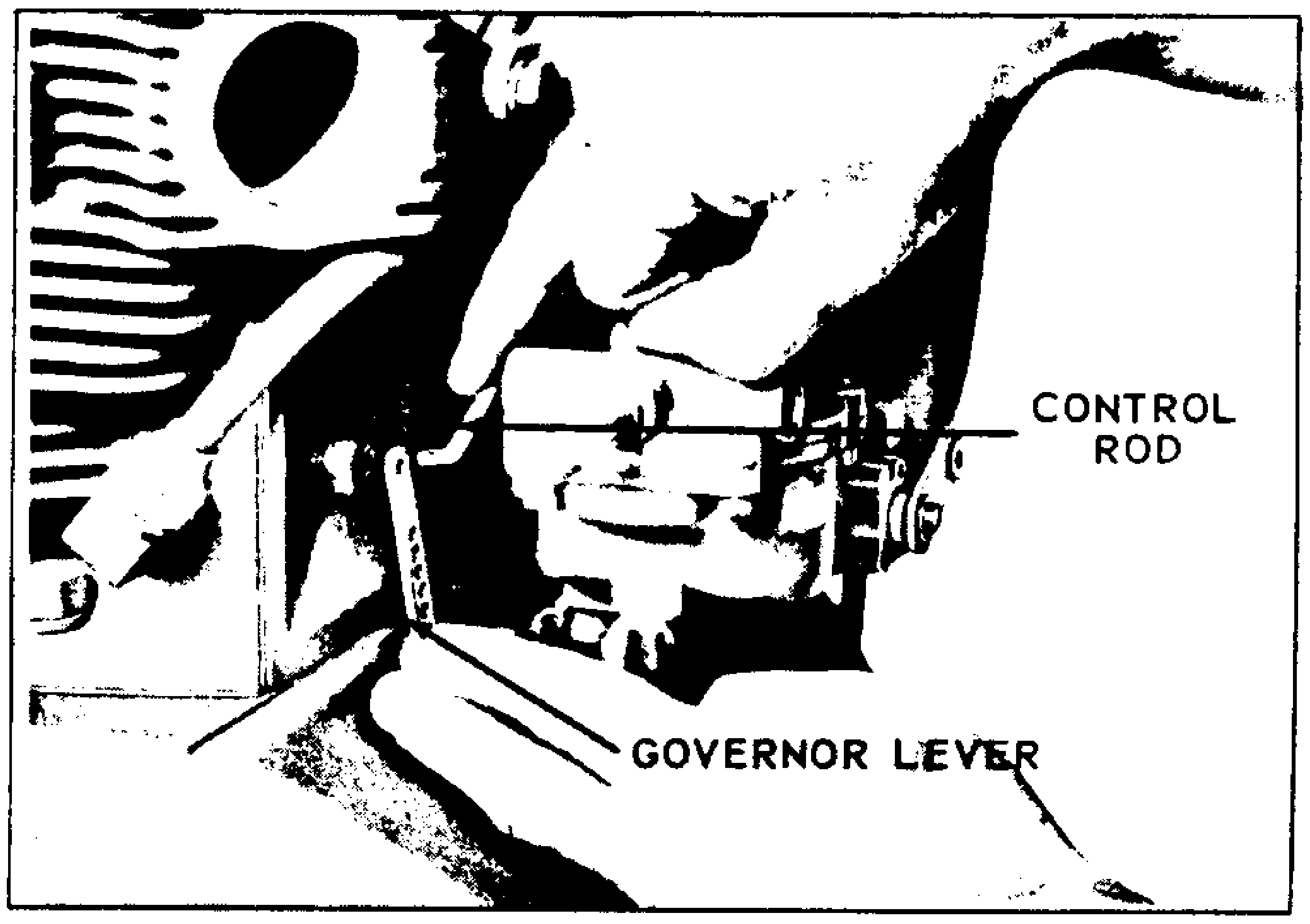
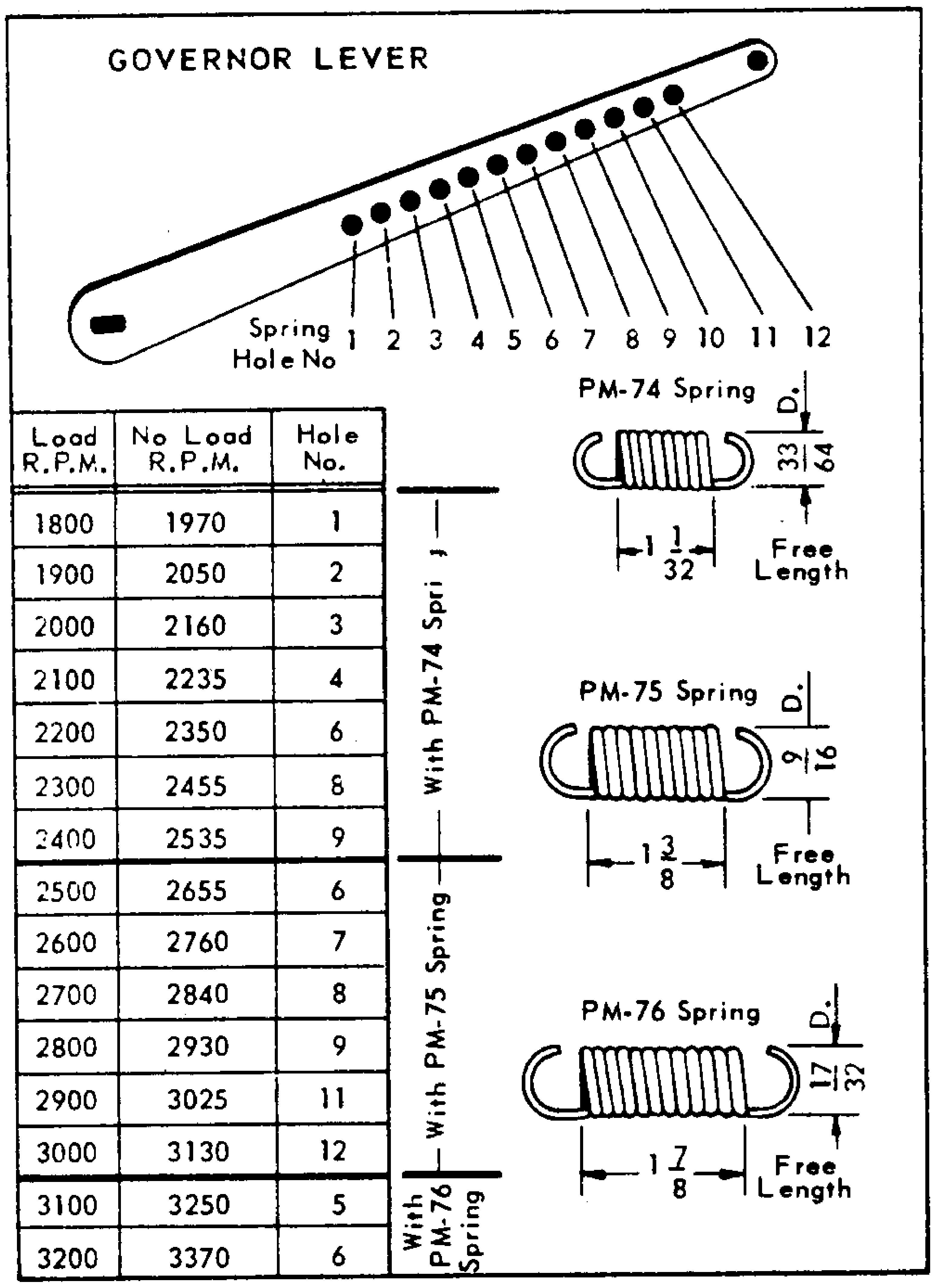


Fig. 30 231089C



Load R.P.M.	No Load R.P.M.	Hole No.	
1800	1970	1	With PM-74 Spring
1900	2050	2	
2000	2160	3	
2100	2235	4	
2200	2350	6	
2300	2455	8	
2400	2535	9	
2500	2655	6	With PM-75 Spring
2600	2760	7	
2700	2840	8	
2800	2930	9	
2900	3025	11	
3000	3130	12	
3100	3250	5	With PM-76 Spring
3200	3370	6	

Fig. 31

PM-74 spring for speeds to and including 2400 R.P.M. load and PM-75 for speeds above 2400 R.P.M. and to and including 3000 R.P.M., PM-76 for speeds above 3000 R.P.M. load. The governor lever is furnished with 12 holes, as shown in *Fig. 31*, for attaching one of these three governor springs. It is very important that the spring is hooked into the proper hole to suit the speed at which the engine is operated. The Governor Lever Chart shows the ***full load*** and ***no load*** speeds of the engine and the hole corresponding thereto. Note that the full load speed is less than the no load speed. As an example, if the engine is to be operated at 2200 revolutions per minute at full load, the spring should be hooked into the 6th hole in the governor lever and the spring tension adjusted by means of the adjusting screw connected to the spring to run 2350 revolutions per minute without load. The speed at full load will then be approximately 2200 revolutions per minute.

Fixed speed governors have an adjusting screw attached to a bracket on the side of the shroud. The tension of the governor spring can be adjusted by means of the adjusting screw nut. Increasing spring tension, increases engine speed, while decreased spring tension lowers the speed.

Most engines are equipped with a ***Variable Speed Control*** as shown in *Fig. 32.* On this type, adjustment is made by means of an ***adjustable bracket*** which is attached to the variable speed governor control. This control is attached to the left side of the air shroud when viewed from the flywheel end of the engine. The ***adjustable bracket*** is mounted on the governor control handle with two round head screws and lockwashers. The governor control chain is attached to this bracket by a cotter pin.

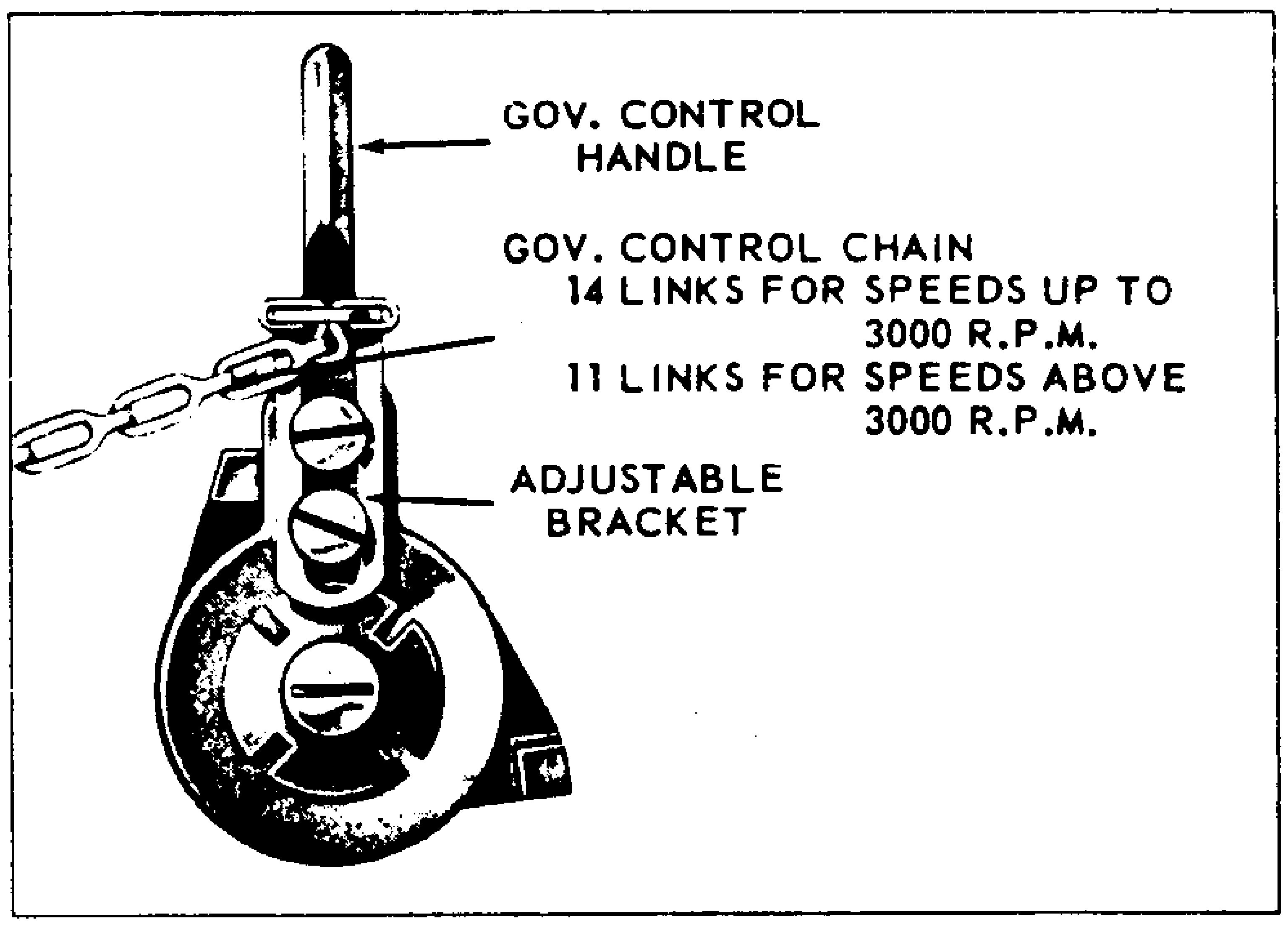

GOV. CONTROL HANDLE
GOV. CONTROL CHAIN
14 LINKS FOR SPEEDS UP TO 3000 R.P.M.
11 LINKS FOR SPEEDS ABOVE 3000 R.P.M.
ADJUSTABLE BRACKET

Fig. 32 78866C

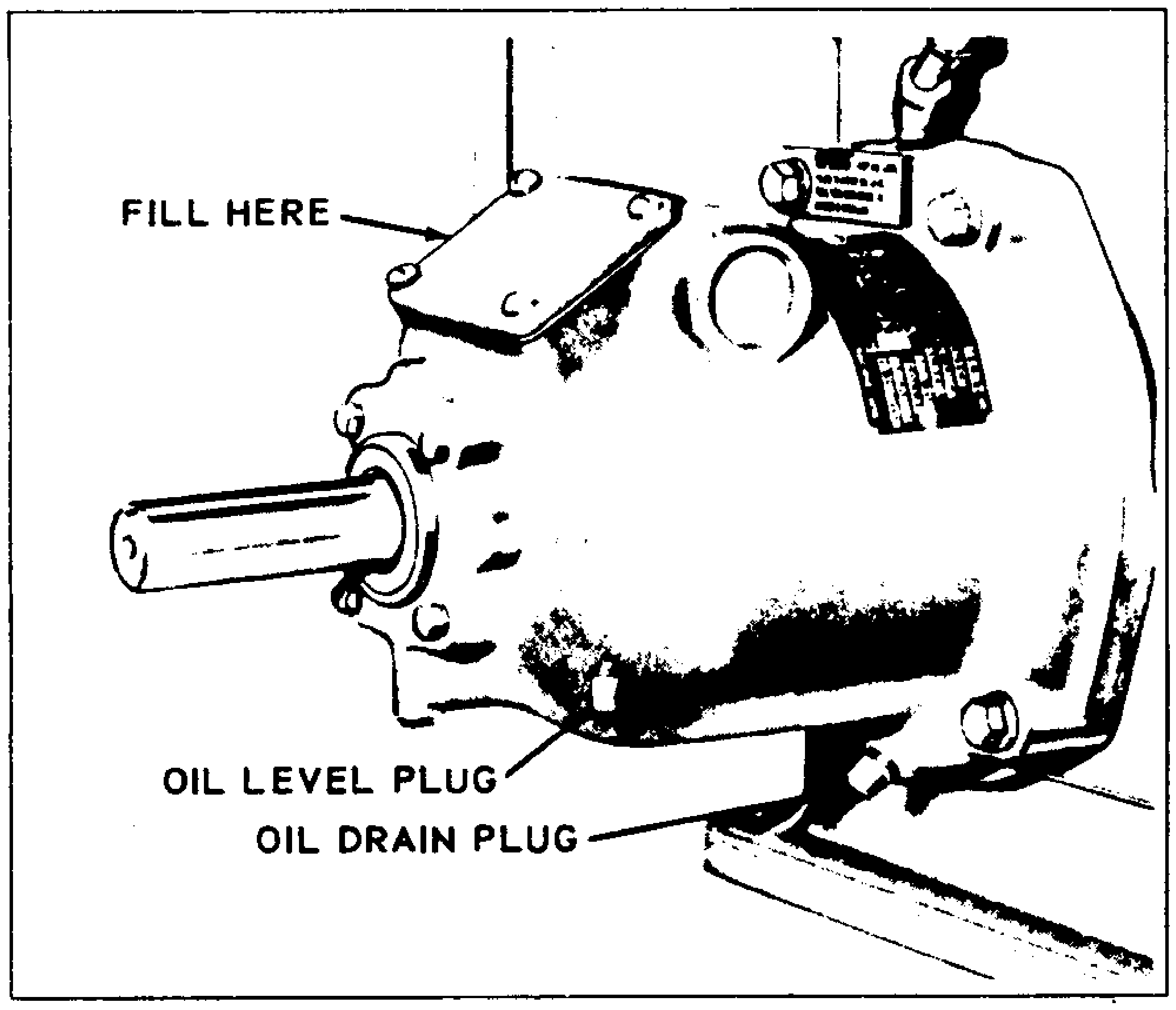


Fig. 33 72770C

To increase the governed speed, the round head screws should be loosened and the bracket moved toward the end of the governor control handle. To decrease speed, the opposite procedure applies. Tighten screws after adjustment is made.

A tachometer or revolution counter should be used against the crankshaft while adjusting the governor spring tension to give the proper engine speed.

CLUTCH AND REDUCTION GEARS

CLUTCH TAKE-OFF

The clutch in the take-off assembly furnished on these models of engines is of the multiple disc type, running in oil. Use the same kind of oil in the clutch as is used in the crankcase of the engine. The oil is filled through the inspection plate opening to the oil level plug; about three quarter pint of oil is required. *See Fig. 33.*

CLUTCH ADJUSTMENT

If the clutch begins to slip, it should be readjusted otherwise it will become overheated and damaged. First remove the inspection plate. This will expose the ***adjusting ring***. Release the clutch lever and rotate the take-off shaft by hand until the ***set screw*** in the adjusting ring is on top. Loosen the set screw, and then with a drift punch turn the ring, in a clockwise direction, a little at a time. The take-off shaft must be held in a stationary position. After each movement of the ring, engage the clutch with the lever. When properly adjusted the clutch will engage with a slight snap. The set screw must then be retightened and the inspection cover replaced. Be sure the gasket is not broken, otherwise oil will leak out and dust may enter the clutch. *See Fig. 34.*

CLUTCH REDUCTION UNITS

The ***clutch*** in the clutch reduction unit is the same as used in the power take-off unit and is adjusted by turning the adjusting ring with a drift punch as explained in the preceding paragraph, *'Clutch Adjustment'* and *Fig. 34.*

REDUCTION GEARS

Reduction gears are furnished with several different ratios, some with spur gears, others with chains. All are of the same general design, except that some are furnished with clutches, others without. These reduction gears require the same grade of oil as is used in the crankcase of the engine. For various installations, these gears are assembled to the engines in various positions. Several plugs are furnished on these reduction gears so that the lubrication may be properly taken care of regardless of the position of installation. For instance, there will always be one plug on top to be used for filling oil. There will always be one plug below for draining oil, and there will be one plug on the side, slightly above the bottom, to be used as an oil level plug, see *Fig. 35.* The oil should always be filled when the engine is at rest. When the oil becomes dirty, it should be drained while the engine is hot, and fresh oil added. The frequency at which these oil changes should be made depends entirely on the kind of service in which these gears are used, but even with light service the change should be made at least once every five hundred hours of operation, adding sufficient oil between changes to keep the oil up to the oil level plug.

STORAGE OF ENGINE FOR WINTER

When the season's work is completed, the following instructions should be carried out very carefully to protect the engine over winter.

The outside of the engine, including the cooling fins on the cylinder and head, should be thoroughly cleaned of all dirt and other deposits.

The air cleaner at the carburetor intake should be thoroughly cleaned of all oil and accumulated dust and sediment removed from the oil cup at the bottom of the cleaner.

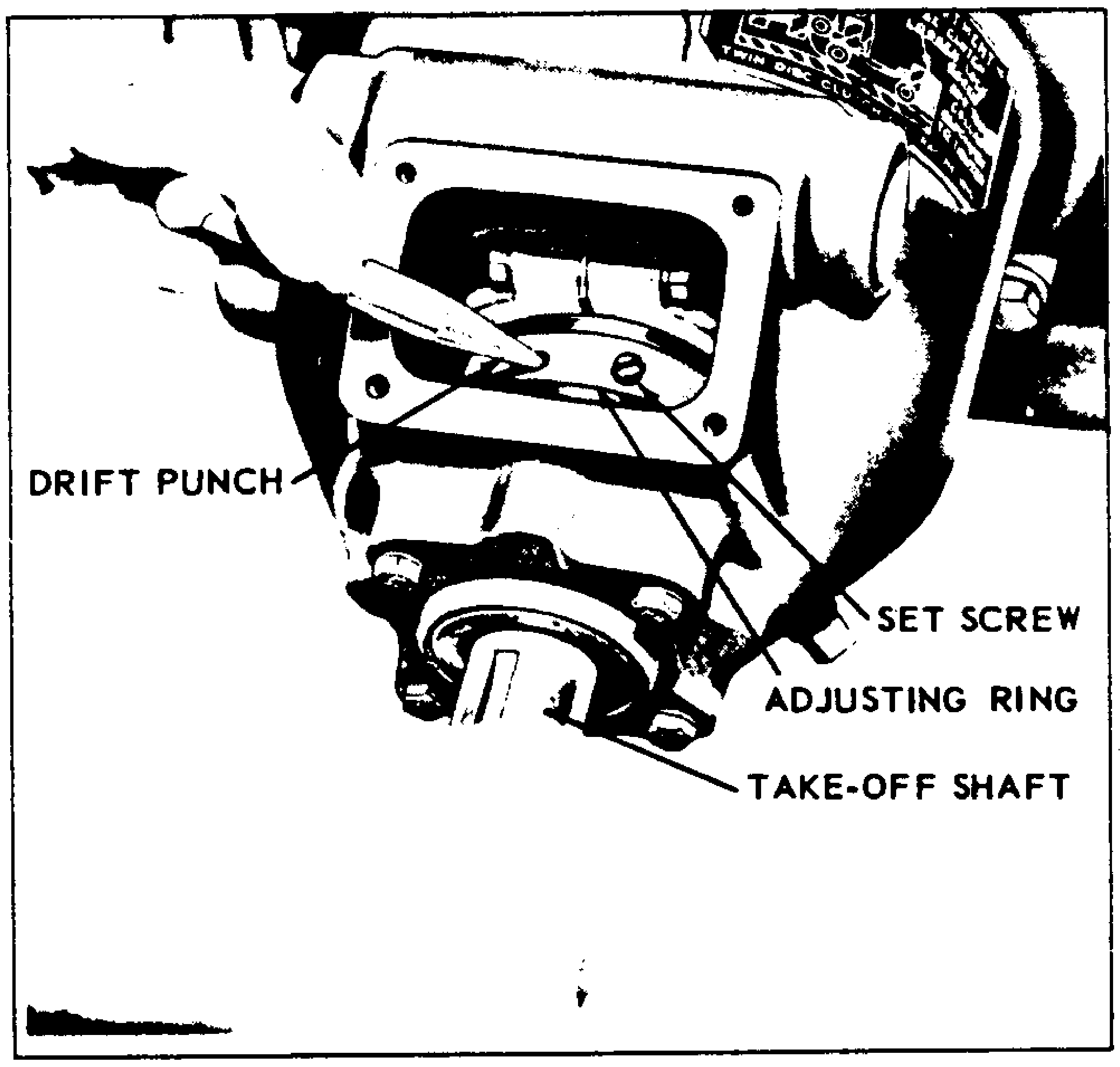


Fig. 34 72773C

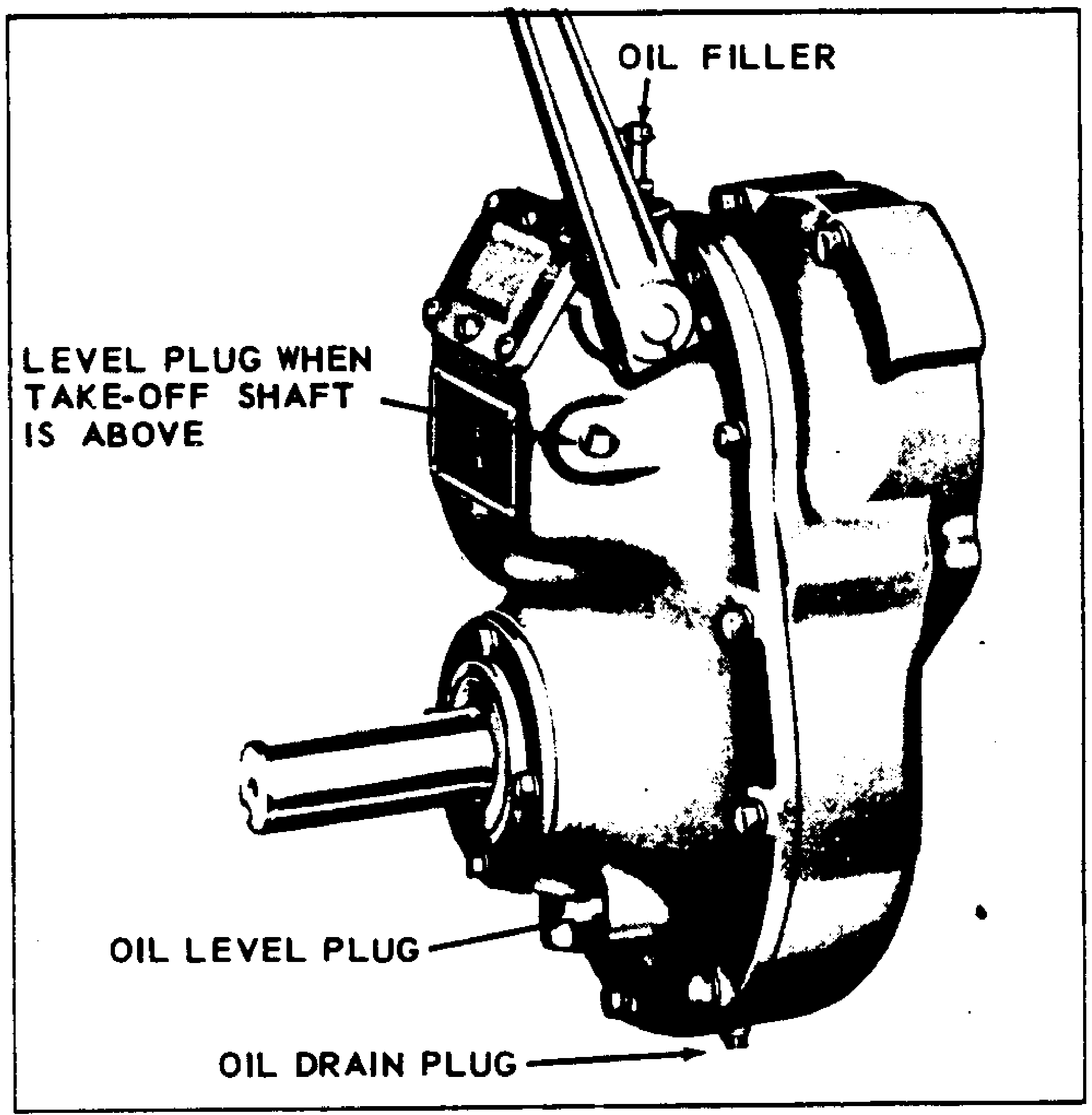


Fig. 35 232353C

To protect the cylinder, piston, rings and valves and keep them from rusting and sticking, a half and half mixture of kerosene and good gas engine oil, (the same kind of oil as used in the crankcase of the engine), should be injected into the air intake on the carburetor while the engine is warm and running at moderate speed. The air cleaner connection will of course have to be disconnected from the carburetor to do this. About a quarter of a pint is necessary, or enough so that a heavy bluish smoke will appear at the exhaust. The ignition switch should then be shut off and the engine stopped. This operation will give a coating of oil on the above mentioned parts, protecting them from the atmosphere.

All old used oil should be drained from the crankcase while the engine is warm, as the oil will then flow more freely than when cold.

Drain fuel system, including gasoline lines, carburetor, fuel pump and tank of all gasoline to prevent lead and gum sediment interfering with future operation.

Turn the engine over slowly, by means of the flywheel until the flywheel key or take-off shaft keyway is up, or in the 12 o'clock position. Both valves will be closed and the piston will be on top in the cylinder bore, with the crankshaft in the described position. This will minimize rusting of the cylinder bore and help in retaining the oil fog previously injected into the engine.

The air cleaner or carburetor intake, as well as the exhaust manifold opening, should be taped or otherwise sealed off, for the duration of the storage period.

All exposed unpainted metal parts should be coated with grease or heavy oil.

Before starting the engine again the next season, the crankcase drain plug should again be removed, so that any condensation, which may have collected during the winter, may be drained before new crankcase oil is added.

A good plan, and one that is recommended, is to remove the crankcase oil base in the spring before starting the engine for the new season, and scrubbing off all sediment which may have collected. Use a new engine base gasket in reassembly.

> ***Be sure to fill the crankcase with a good quality of crankcase oil to the high level point, before starting the engine. Do not use any oil heavier than S.A.E. No. 30.***

It is also recommended to use a new spark plug at the beginning of the next season, especially if the engine has given considerable service.

Refuel engine and follow the starting instructions as shown on preceding pages of this manual.

> ***It is highly recommended that machines be stored inside a building through the winter. If this is not possible, the engine should be protected from snow and ice by a proper covering.***

CLUTCH ADJUSTMENT (Rockford Clutch)

First remove the inspection plate which will expose the notched ***adjusting ring.*** Release the ***clutch,*** by pushing the ***engaging lever*** forward. Turn engine over until the clutch ***adjustment lock*** is visible thru the inspection opening. Loosen ***adjustment lockscrew,*** one full turn. Keep the crankshaft from turning, then, by means of a screw driver as shown in *Fig. 36,* turn the ***adjusting ring,*** one notch at a time in a clockwise direction, until a very firm pressure is required to engage the clutch with the lever. Be sure that the clutch cams snap over-center on final adjustment. Securely tighten adjustment lockscrew.

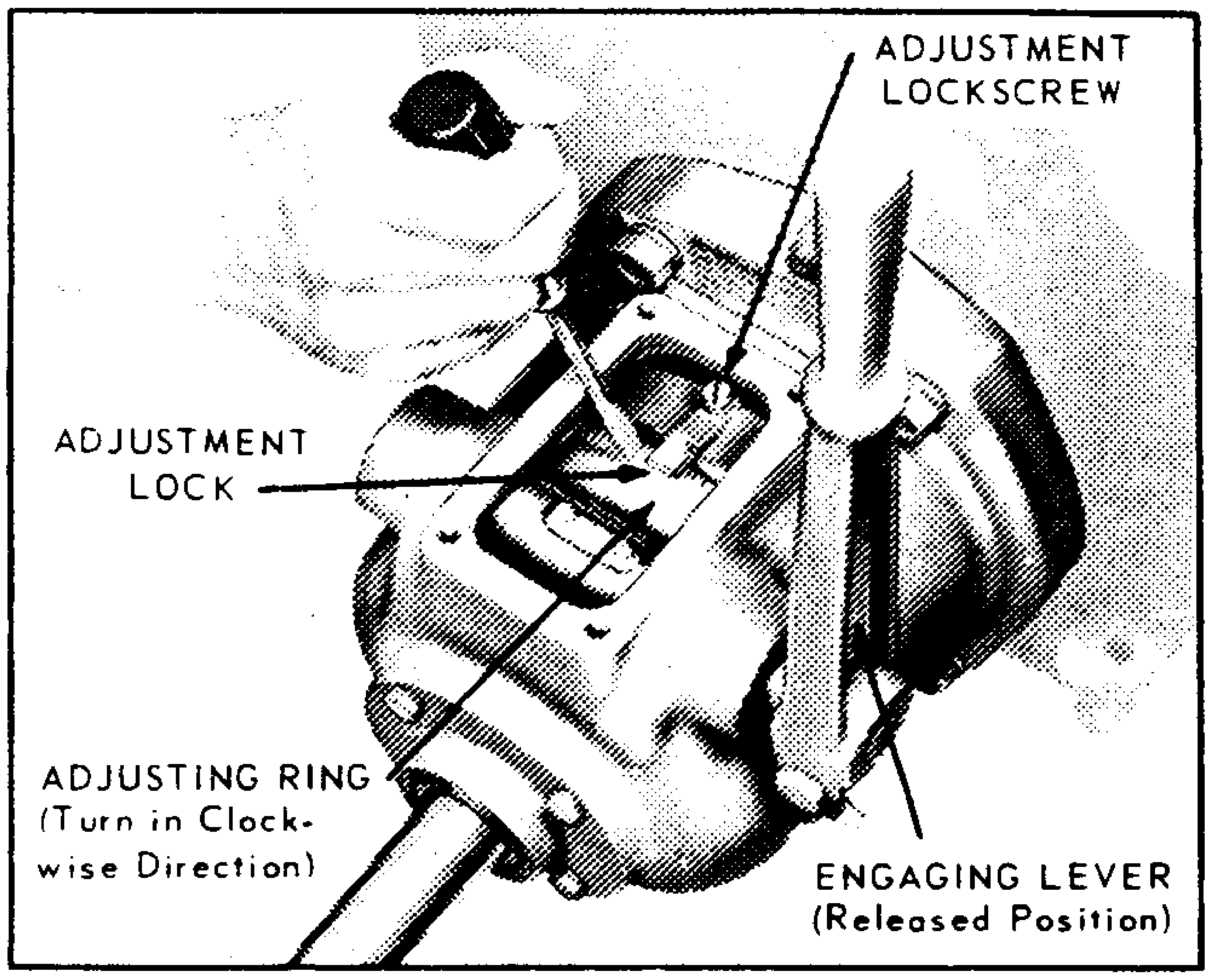

ADJUSTMENT LOCKSCREW
ADJUSTMENT LOCK
ADJUSTING RING (Turn in Clockwise Direction)
ENGAGING LEVER (Released Position)

Fig. 36, ROCKFORD CLUTCH ADJUSTMENT

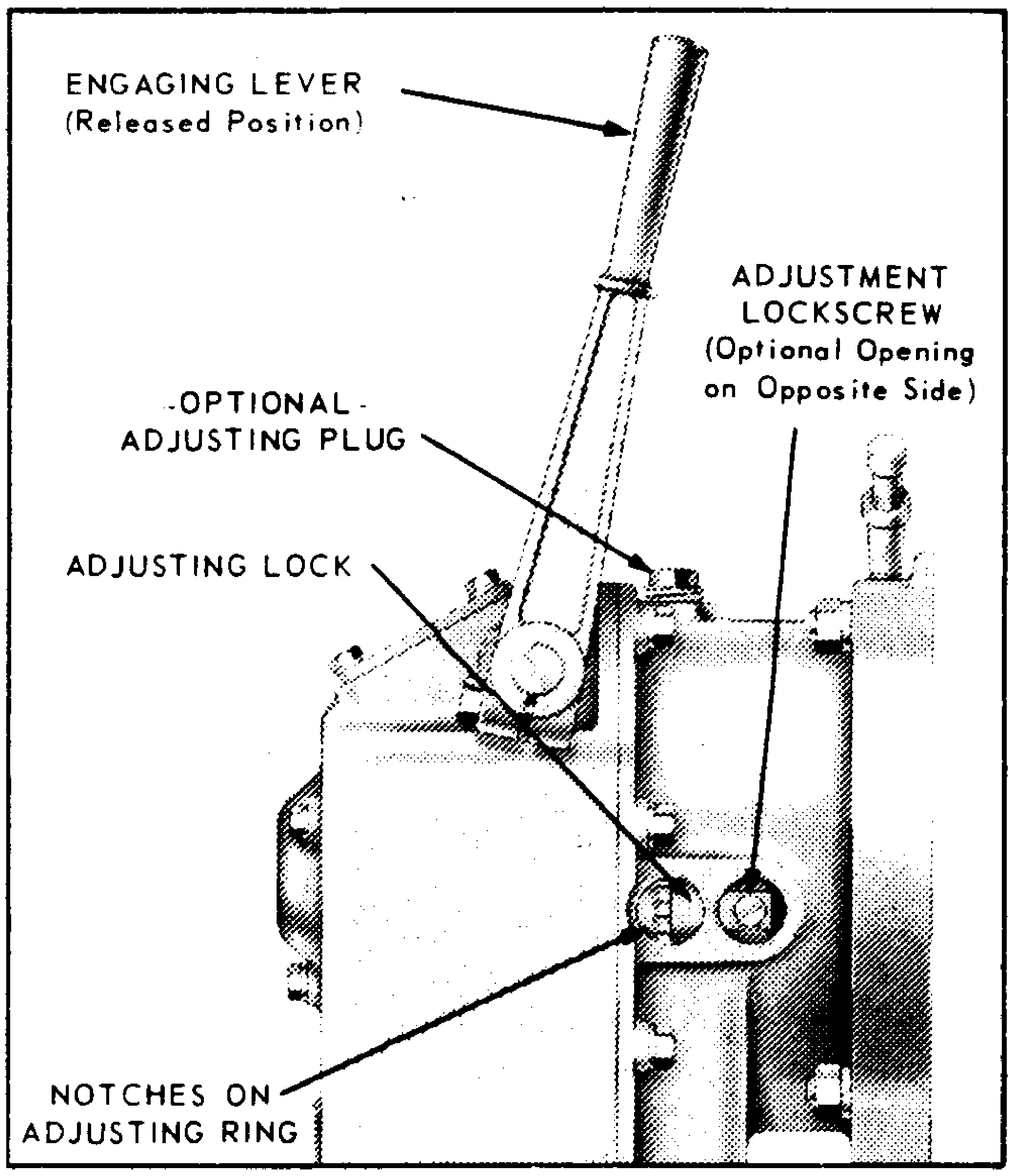

ENGAGING LEVER (Released Position)
ADJUSTMENT LOCKSCREW (Optional Opening on Opposite Side)
-OPTIONAL-
ADJUSTING PLUG
ADJUSTING LOCK
NOTCHES ON ADJUSTING RING

Fig. 37, ROCKFORD CLUTCH RED. ADJUSTMENT

CLUTCH REDUCTION – ADJUSTMENT

The clutch in the clutch reduction unit is the same as used in the clutch take-off assembly. The clutch adjustment is made thru two pipe tap openings; one for the ***adjustment lockscrew*** and the other for turning the ***adjusting ring,*** as illustrated in *Fig. 37.* There are four ½ inch square head pipe plugs in the housing, to provide a means of adjusting the clutch regardless of what position the unit is mounted in.

Remove the two pipe plugs on the side of the housing (if not accessible, use the two optional taps). Disengage the clutch and turn engine over slowly with the starting crank until the ***adjustment lockscrew*** is visible thru the pipe plug opening nearest to the engine. Loosen ***lockscrew*** one full turn, or enough to relieve the tension of the lock against the notches on the ***adjusting ring.*** Then, turn engine over slightly to expose the ***notches*** on ***adjusting ring.*** Keep engine crankshaft from turning, while thru the adjacent pipe plug opening, turn the ***adjusting ring*** with a screw driver, one notch at a time in a clockwise direction (viewing from take-off end), until a very firm pressure is required to engage the clutch with the lever.

REPAIR PARTS LIST

READ THESE INSTRUCTIONS BEFORE ORDERING PARTS

The **MODEL, SPECIFICATION** and **SERIAL NUMBERS** of your engine, shown on the name plate prominently located on the engine, **MUST BE GIVEN WHEN ORDERING PARTS.**

COPY THE ABOVE SPECIFIED INFORMATION INTO THE SPACES PROVIDED BELOW
SO THAT IT WILL BE AVAILABLE TO YOU WHEN ORDERING PARTS.

MODEL	AGND			**SERIAL NO.**	5660416
SIZE	3.5X4"	**R.P.M.**	2800	**SPEC. NO.**	385566

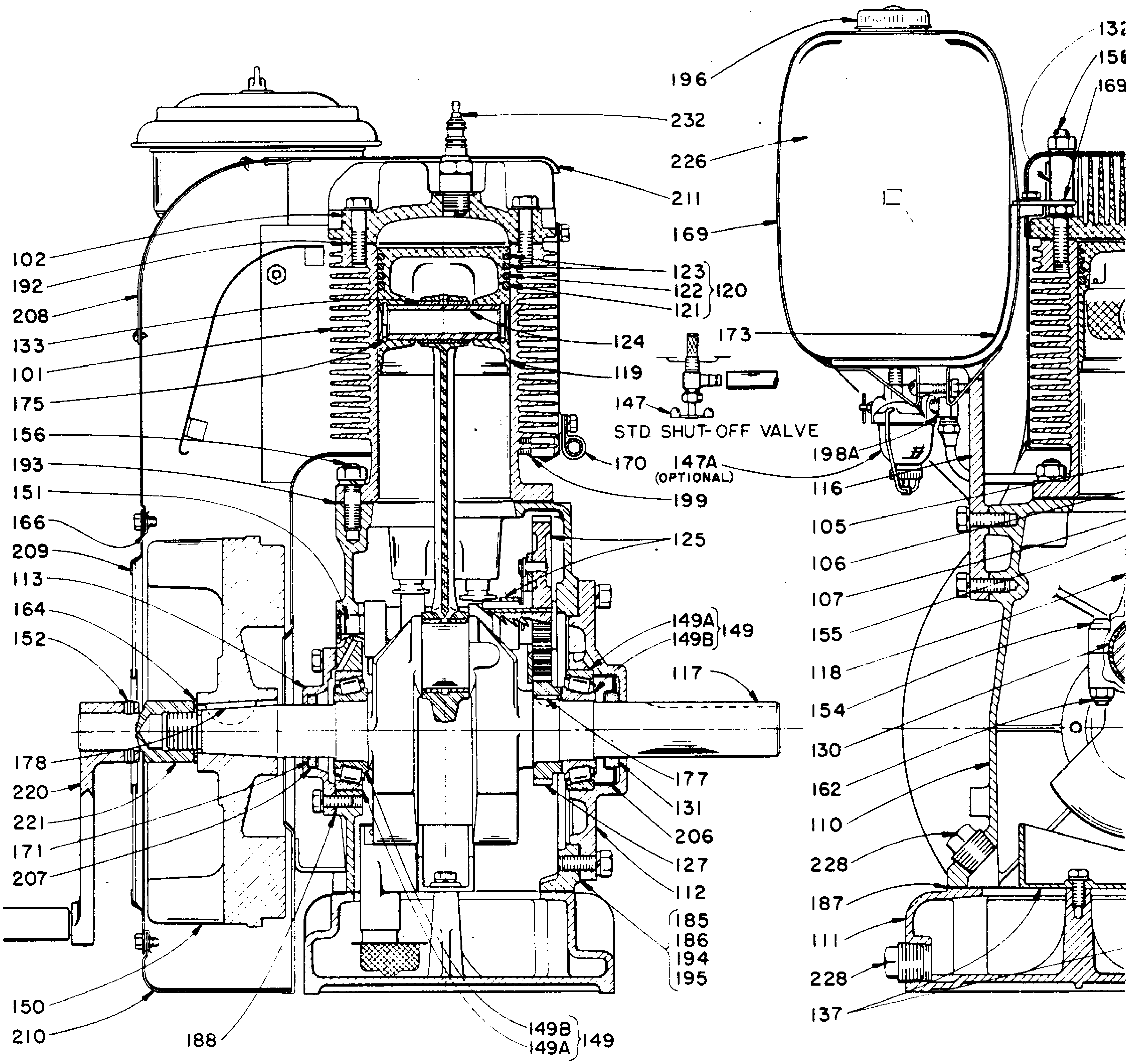
12.2 Hp.

TO INSURE PROMPT AND ACCURATE SERVICE, THE FOLLOWING INFORMATION MUST ALSO BE GIVEN.

1. State exactly, quantity of each part and part number.
2. State definitely, whether parts are to be shipped by express, freight or parcel post.
3. State exact mailing address.

SERVICE FACILITIES

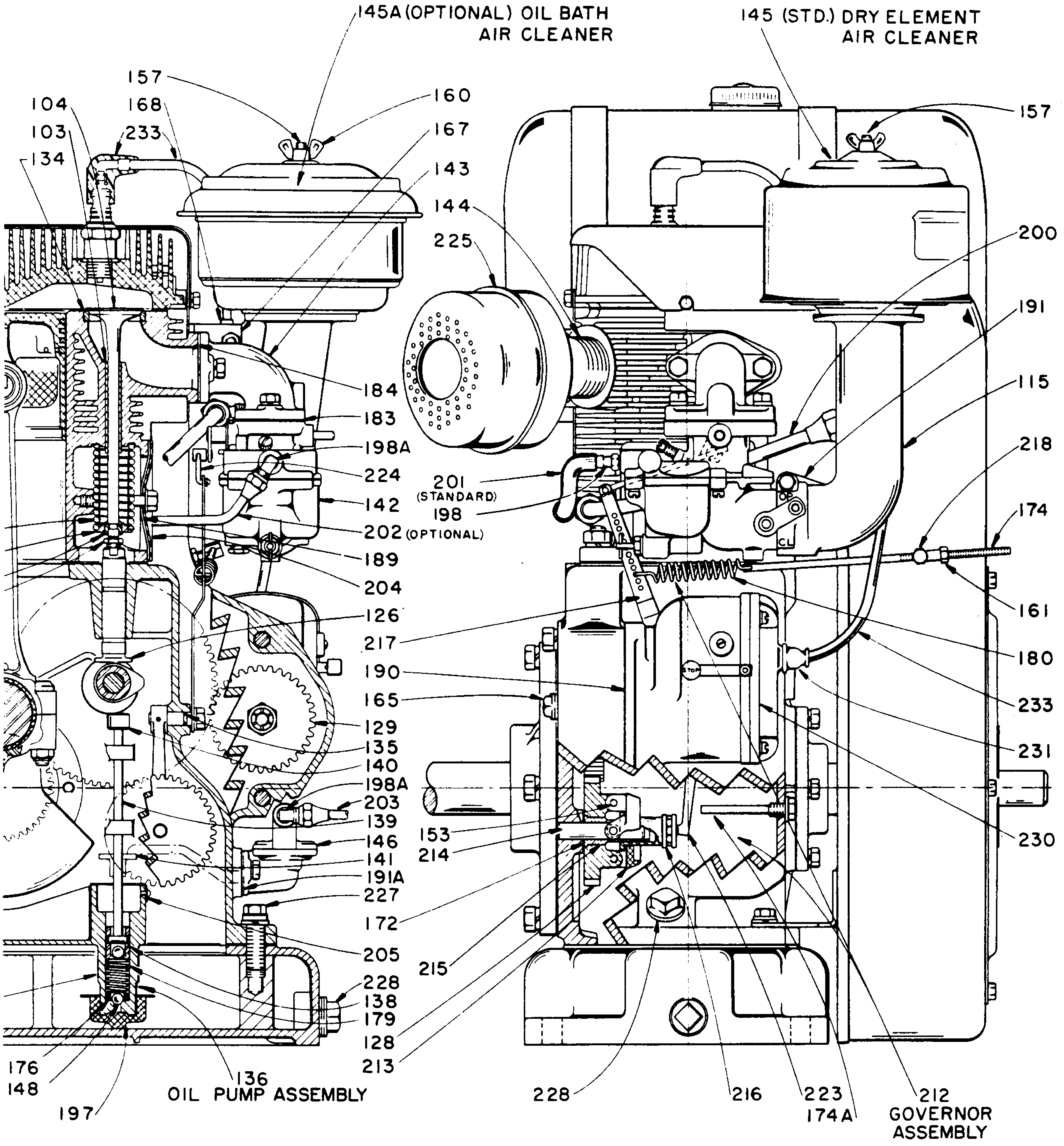
Wisconsin Engine Distributors and Service Centers, located throughout the U.S. and foreign countries, have been carefully selected in order to assure complete and efficient repair and inspection service to owners of Wisconsin Engines. These service centers, equipped and staffed for complete engine repair, also stock parts to facilitate immediate delivery for all Wisconsin Air Cooled Engine Models. Order parts from the Wisconsin Distributor or Service Center in your locality — **Do not** order parts from TELEDYNE TOTAL POWER.



WISCONSIN MOTOR

PARTS REFERENCE

Parts are identified by reference number.



MODEL AGND

MODEL AGND

See parts list for correct part number.

STANDARD ENGINE PARTS LIST **MODEL AGND**

Accessories commonly supplied on this model engine begin on Page 31.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
101	AA-96-A-S1	**CYLINDER BLOCK ASSEMBLY** .... Complete — Consisting of: 1 AA-96-A Block 2 AH-9 Locks 2 AD-42 Guides 1 AG-150-A Seat 1 AE-87 Valve 1 AG-150-[illegible] Seat 1 AE-87-D Valve 1 PH-14 Washer 1 AF-52 Spring 1 QD-12-A Gasket 1 AF-55 Spring 1 SA-[illegible] Cover 1 AG-26 Seat 1 XD-148 Screw 1 AG-31 Rotator	1	25	
102	AB-102-A	**CYLINDER HEAD**	1	2	6
103	AD-42	**VALVE STEM GUIDE**	2		1
104	AE-87	**INLET VALVE**	1		4
	AE-87-D	**EXHAUST VALVE**	1		4
105	AF-52	**VALVE SPRING,** inlet .... 3-1/8" approx. free length. Spring rated at 55 pounds when compressed to approx. 2" height.	1		2
	AF-55	**VALVE SPRING,** exhaust, for engine with **VALVE ROTATOR.** 2-3/4" free length. Spring rated at 55 pounds when compressed to approx. 1-7/8" height.	1		2
106	AG-26	**SEAT** for inlet valve spring	1		1
	AG-31	**VALVE ROTATOR** and **SPRING SEAT** For exhaust valve spring.	1		1
107	AH-9	**LOCK** for valve spring seat	2 pr		1
110	See Fig. A	**CRANKCASE ASSEMBLY** .... Consisting of: 1 Crankcase 1 ME-66-1 Bearing cup 5 PC-337 Studs 1 SA-13 Plug 1 TD-38-2 Governor shaft	1	30	

NOTE: The basic standard crankcase part number is **BA-54.** Any special machining is indicated by a number stamped in the location shown in **FIG. A.** Add this number to **BA-54.** Order by complete number and by giving the Model, Spec. and Serial Numbers of engine.

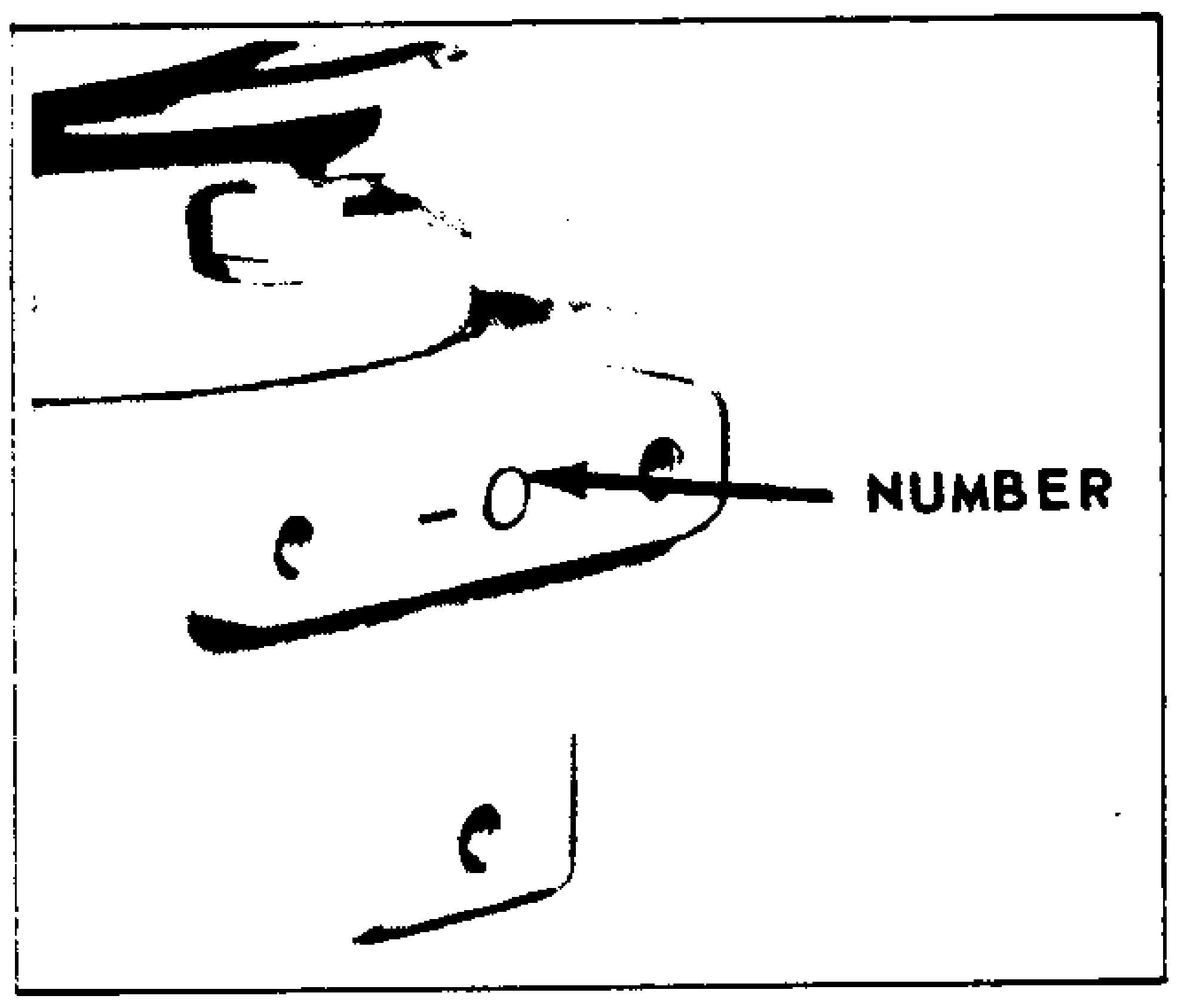


Fig. A 231081C-A

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
111	BB-119-A	**ENGINE BASE** .... **BB-119A-2** for engines with electric starting motor.	1	18	

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
112	BG-105A-2-S2	**MAIN BEARING PLATE ASSEMBLY** .... Take-off end. Consisting of: 1 BG-105A-2 Plate 1 HF-236 Seal 1 ME-66-1 Bearing cup 1 SI-35 Retainer	1	5	

NOTE: Engines equipped with a clutch, or clutch reduction unit, require a special main bearing plate as specified in rear section of this manual where these accessories are located.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
113	BG-125-S1	**BEARING RETAINER PLATE ASSEMBLY,** Flywheel end .... Consisting of: 1 BG-125 Plate 1 SI-39-1 Retainer 1 PH-193-1 Seal	1	1	2
		BG-343-S1, for engines equipped with **flywheel alternator**	1		
115	BI-332-S1	**AIR CLEANER BRACKET ASSEMBLY** Consisting of: 1 BI-332 Bracket 1 QD-647 Gasket 1 XD-8 Screw	1		8
116	BI-333-A	**FUEL TANK BRACKET,** only, for eng's. beginning with Serial No. 2960485.	1	4	8
	BI-333A-S1	**FUEL TANK** and **BRACKET ASSEMBLY** BI-333 Bracket for engines to and including Serial No. 2960484. For replacement, order BI-333A-S2 Tank and Bracket Assembly.		7	8
117	See Fig. B	**CRANKSHAFT ASSEMBLY** .... Consisting of: 1 Crankshaft 1 GA-30-B Gear 2 ME-66 Bearings 1 PL-55 Key	1	18	8

NOTE: The basic crankshaft part number is **CA-73.** Dash numbers are added to the basic part number to identify special machining at the take-off end. The dash (-) number will be found stamped on the cheek facing the take-off end of the shaft, as illustrated in **Fig. B.** Order by **complete part number,** (dash number added to basic number) and by giving the **model, spec.** and **serial** numbers of engine.

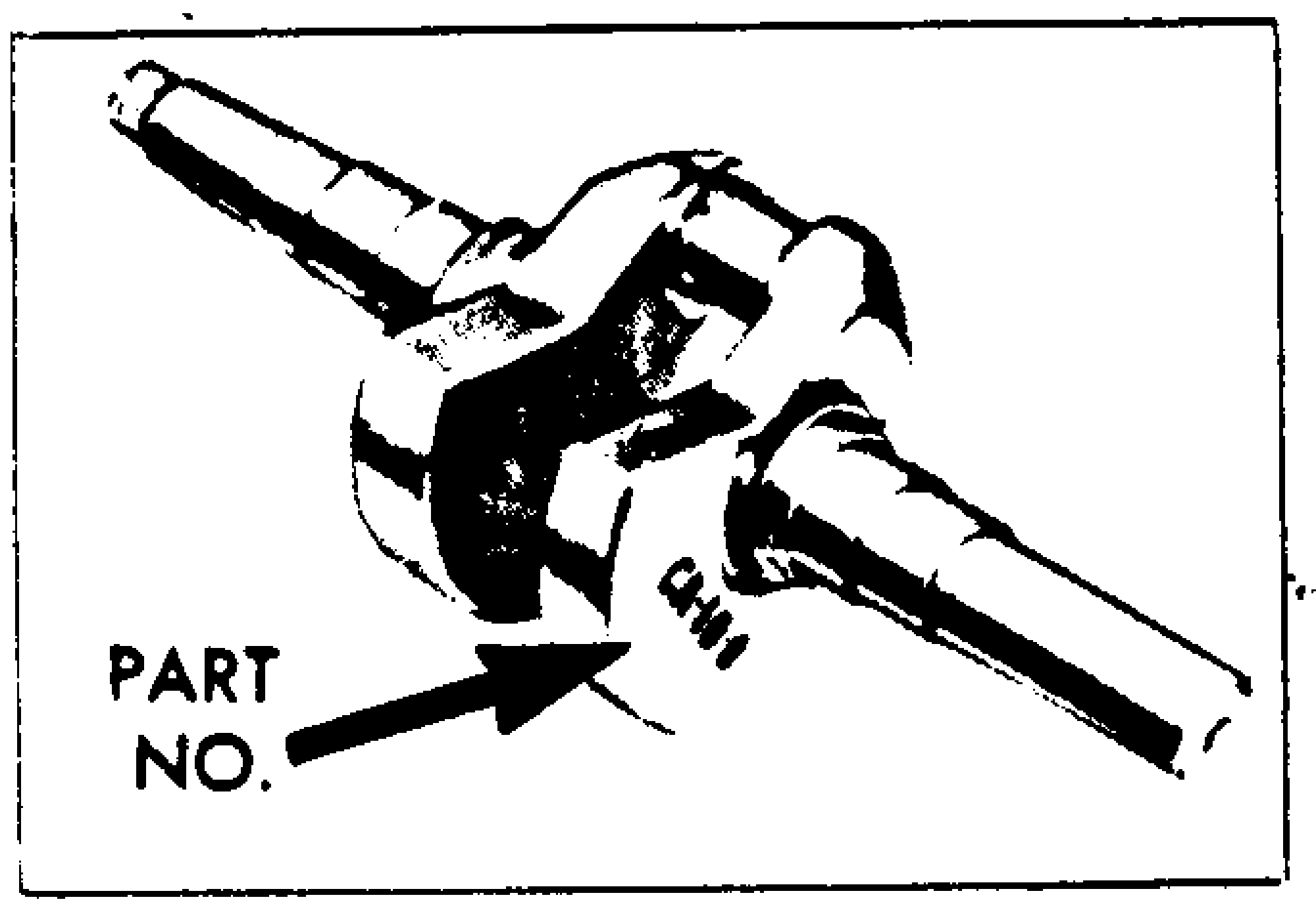


Fig. B 141332C-1

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
118	DA-69-A-S1	**CONNECTING ROD ASSEMBLY** .... (shell bearing type)	1	1	6

NOTE: The connecting rod is furnished **less** shell bearings. Refer to Ref. No. **130** for the part number of standard size and undersize shell bearings available.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		DA-69-S1, Babbitt-lined rod. For replacement use **DA-69-A-S1** and shell bearings.			

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

Model AGND Parts List

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
119	DB-220	**PISTON,** cam ground, standard size ...... **NOTE:** Pistons are available, .010", .020", .030" oversize.	1		13½
120	DR-32	**PISTON RING SET,** standard size .... Consisting of:	1		4
121	DC-111-B	**OIL RING**	1		1
122	DC-126A-1	**SCRAPER RING**	1		1
123	DC-126-C	**COMPRESSION RING** .... **NOTE:** Ring sets are available .010", .020" and .030" oversize.	2		1
	DR-43	**TRI CROME RE-RING SET,** Std. size .. .010", .020", .030" oversize available.			5
124	DE-63	**PISTON PIN,** standard size .... **NOTE:** Piston pins are available .005" and .010" oversize.	1		4
125	EA-115-B-S1	**CAMSHAFT** and **GEAR ASSEMBLY** ...... Beginning with Serial No. 4394816. Includes: Compression release FA-216 Support pin EA-115-S1 (without compression release) For replacement use EA-115-B-S1.	1	2	8
126	F-63	**VALVE TAPPET** with lockscrew	2		4
127	GA-30-B	**CRANKSHAFT GEAR**	1		12
128	GD-124-A	**GOVERNOR GEAR** and **FLYWEIGHT ASSEMBLY** .... Consisting of: 1 GD-124 Gear 2 TC-322F Flyweights 2 FA-340 Pins 2 TC-328D Pins 1 FH-313A Shim 1 TC-389A Bushing	1		8
129	GD-125	**MAGNETO GEAR**	1		12
130	HA-132-S	**SHELL BEARING** (2 halves) std. size For connecting rod. **NOTE:** The following undersize shell bearings are also available: **HA-132-S1** .... (.001" undersize) **HA-132-S2** .... (.002" undersize) **HA-132-S10** .... (.010" undersize) **HA-132-S20** .... (.020" undersize)	1		4
131	HF-236	**CORK OIL SEAL** .... For main bearing, take-off end.	1		1
132	HF-550	**SPACER** for air shroud cover stud	1		2
133	HG-131-C	**PISTON PIN BUSHING** .... HG-131-A-1, replaced by HG-131-C.	1		1
134	HG-150-A	**VALVE SEAT INSERT,** inlet	1		1
	HG-150-D	**VALVE SEAT INSERT,** exhaust	1		1
135	JK-50	**'O' RING** for governor lever fulcrum pin	1		1
136	K-110	**OIL PUMP ASSEMBLY** complete .... Consisting of: 1 KA-65-S1 Body assembly 1 KF-18-1 Push rod 1 KF-19-A Cap 2 EF-4 Lockwashers 2 XH-15 Capscrews	1		
137	KA-65-S1	**OIL PUMP** and **BODY ASSEMBLY** .... Consisting of: 1 KA-65 Body 1 PM-56 Spring 1 KF-14-S1 Plunger 1 RD-107-A Screen 1 ME-38-A Ball 1 SA-109 Cover 1 PK-50-A Retainer 2 XA-67 Screws	1	2	
138	KF-14-S1	**OIL PUMP PLUNGER ASSEMBLY** .... Consisting of: 1 KF-14 Plunger 1 ME-38-A Ball 1 PA-217 Pin	1		2
139	KF-18-1	**OIL PUMP PUSH ROD,** 5-27/32" long ..	1		2
		KF-26-4 4-3/16" long rod, for engines with fuel pump			1
140	KF-19-A	**CAP** for oil pump push rod	1		1
141	KF-29-B	**PLUNGER** for engines with fuel pump ..	1		2
142	L-63-A-S1	**CARBURETOR,** Zenith No. 12188	1	1	4
		LQ-33 Repair Kit	1		2
	Optional L-64-A-S1	**CARBURETOR,** Marvel-Schebler No. TSX-770.			

NOTE: Special carburetors are identified by Part Number stamped on carburetor name plate. Refer to this number for service replacement carburetor or parts. See carburetor bulletins in back of manual for service replacement parts list.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
143	LC-276	**INTAKE MANIFOLD**	1		6
144	LJ-312	**NIPPLE,** 1¼" x 2¾" long, W.I. pipe ...... For exhaust muffler mounting.	1		6
145	LO-175 (Standard)	**AIR CLEANER – Dry Element type** ...... Service parts:	1	1	
		LO-175-B Element	1		4
		LO-175-D Body	1		8
		SD-295 Decal	1		1
145A	LO-24 (Optional)	**AIR CLEANER – Oil Bath type** .... Service parts:	1	1	12
		81-179B1 Cap and filter assembly ..	1	1	2
		81-176B1K01 Oil cup	1		6
		81-615A1 Filter gasket	1		1
		QD-540 Base gasket	1		1
146	LP-42-G-S1	**FUEL PUMP** (not standard)	1		10
	LQ-28	**REPAIR KIT** for fuel pump .... **NOTE:** Refer to fuel pump instruction sheet in back of manual for maintenance and repair.	1		2
147	RG-41	**SHUT-OFF VALVE** and **STRAINER** .... (standard)	1		
147A	Optional LP-43	**FUEL STRAINER** .... **LQ-31** Repair Kit (bowl, gasket, screen) **NOTE:** See illustration in back of parts list for service replacement parts.	1		5
148	ME-38-A	**CHECK BALL** for oil pump, 5/16" dia. steel .... ME-38, replaced by ME-38-A.	1		1
149	ME-66	**MAIN BEARING ASSEMBLY** .... Consisting of:	2	1	
149A		1 **ME-66-1** Cup *			
149B		1 **ME-66-2** Cone * * Not sold separately.			

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

Model AGND Parts List

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
150	NC-145-G	**FLYWHEEL,** Standard	1	33	
		NC-145-J-S1 for engine with YA-39 starting motor, beginning with Serial No. 5,252,140. incl. **GH-55** Ring Gear.			
		NC-145G-13-S1 for engine with starting motor — to and including Serial No. 5,252,139. Includes **GH-46** Ring Gear.			
		NOTE: Because of the variations in flywheels; for mounting rotating screens, stub shafts, flywheel alternators, etc., only the standard and ring gear flywheels are listed. Therefore, give Model, Specification and Serial Numbers of engine when ordering new flywheel.			
151	PA-216	**CAMSHAFT SUPPORT PIN**	1		6
152	PA-333	**ROLL PIN** for hand cranking	1		1
153	PA-340	**ROLL PIN** for governor flyweight	2		1
154	PB-146-1-S1	**CONNECTING ROD BOLT ASSEMBLY** Includes: 1 PD-247 Nut.	2		2
155	PB-169-A	**VALVE TAPPET ADJUSTING SCREW**	2		1
156	PC-337	**STUD** for mounting cylinder block	5		2
157	PC-372	**STUD** for oil bath air cleaner, 3-3/8" lg.	1		1
	PC-372-A	**STUD** for dry element cleaner, 3-9/16" lg.	1		1
158	PC-526	**STUD** for mounting cylinder head at tank PC-498, replaced by PC-526.	1		2
160	PD-147	**WING NUT** for air cleaner mounting	1		1
161	PD-173-A	**ADJUSTING NUT** for governor spring ..	1		1
162	PD-247	**LOCK NUT,** 3/8"-24 thread (special) .. For connecting rod bolts.	2		1
164	PE-59	**LOCKWASHER,** 1" external Everlock .. For starting crank nut.	1		1
165	XK-4	**PLUG,** 1/2" square head, pipe .... For timing hole in crankcase.	1		1
166	PG-315	**SPEED NUT** for flywheel screen mtg. ..	4		1
167	PG-343-C	**SUPPORT CLIP** for air cleaner bracket PG-343-A, PG-343-D, repl'd by PG-343-C.	1		1
168	PG-430	**SUPPORT CLIP** for ignition cable	1		1
169	PG-864	**FUEL TANK STRAP**	2		4
169A	PG-891	**SUPPORT** for fuel tank bracket	1		1
170	PG-961	**CLIP** for flexible fuel line	1		1
171	PH-193-1	**CORK OIL SEAL** .... For bearing plate, flywheel end.	1		1
172	PH-313-A	**SHIM** for governor gear bushing	1		1
173	PH-479	**FELT** for fuel tank straps	2		1
174	PI-145-J	**ADJUSTING SCREW** for gov. spring	1		2
174A	PI-185	**STOP SCREW,** governor assembly	1		1
175	PK-37-A	**RETAINING RING** for piston pin .... PK-37, replaced by PK-37-A.	2		1
176	PK-50-A	**RETAINER** for oil pump check ball	1		1
177	PL-55	**WOODRUFF KEY,** No. 6 .... For crankshaft gear.	1		1
178	PL-83	**WOODRUFF KEY,** No. 23 .... For flywheel.	1		1
179	PM-58-E	**SPRING** for oil pump plunger.................. PM-58, replaced by PM-58-E.	1		1
180	PM-74	**GOVERNOR SPRING,** 1-1/32" free length of coils x 1/2" O.D. .... For engine speeds up to and including 2400 R.P.M.	1		1
	PM-75	**GOVERNOR SPRING,** 1-3/8" free length of coils x 9/16" O.D. .... For engine speeds 2450 to 3000 R.P.M.			1
	PM-76	**GOVERNOR SPRING,** 1-7/8" free length of coils x 17/32" O.D. .... For engine speeds above 3000 R.P.M.			1
181	Q-31	**ENGINE GASKET SET** (not illustrated) Consisting of: 1 QC-71 1 QD-514-B 1 QD-647 1 QC-71-A 1 QD-518 1 QD-712 3 QD-479-A 1 QD-612-A 1 QD-713-A 2 QD-479-C 1 QD-616	1		6
183	QC-71	**GASKET** for carburetor flange .... QC-58, replaced by QC-71.	1		1
184	QC-71-A	**GASKET** for manifold to cylinder block QC-56-A, replaced by QC-71-A.	1		1
185	QD-479-A	**GASKET** for main bearing plate, T.O. end .006" to .007" thick.	3		1
186	QD-479-C	**GASKET** for main bearing plate, T.O. end .003" to .004" thick.	2		1
187	QD-514-B	**GASKET** for engine base	1		1
188	QD-518	**GASKET** for bearing retainer plate .... Flywheel end.	1		1
189	QD-612-A	**GASKET** for valve inspection cover plate	1		1
190	QD-616	**GASKET** for magneto flange	1		1
191	QD-647	**GASKET** for air cleaner bracket slot	1		1
191A	QD-670	**GASKET** for fuel pump mounting	1		1
192	QD-712	**GASKET** for cylinder head	1		1
193	QD-713-A	**GASKET** for cylinder base	1		1
194	QF-62	**SHIM** for main bearing plate, T.O. end .. .013" to .014" thick. * Use 1 or 2 as required.	*		1
195	QF-62-A	**SHIM** (obsolete) for main bearing plate, T.O. end .... ** Use 2 if required.	**		1
196	RC-122	**FUEL TANK CAP** (screw-type) .... For **WE-417** fuel tank. **RC-77** cap for obsolete WE-344 bayonet neck type tanks.	1		2
197	RD-107-A	**OIL PUMP SCREEN** .... RD-107, replaced by RD-107-A.	1		1
198	RF-1438	**STRAIGHT FITTING** (standard) .... For flexible fuel line in carburetor.	1		
198A	Optional RF-1225	**ELBOW FITTING** for bundy weld fuel line .... 1-in carburetor. 1-in fuel strainer. 2-for fuel pump.	4		1
199	RF-296	**ELBOW** for breather line .... 1-in cylinder block. 1-in air cleaner bracket.	2		1
200	RM-1357	**BREATHER LINE,** 3/8" tubing with nuts air cleaner bracket to cylinder block ...... RM-185, replaced by RM-1357.	1		2

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IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

Model AGND Parts List

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
201	LL-178-15	**FLEXIBLE FUEL LINE,** 15" long, 1/4" neoprene tubing	1		
202	Optional RM-846	**FUEL LINE,** 13" long, 1/4" bundy weld tubing with nuts Fuel tank to carburetor — **strainer at T.O. end.** **RM-536** (19-1/2" long) with strainer at flywheel end.	1		
203	Optional RM-776	**FUEL LINE,** ¼" tubing, 9½" long, with nuts, **fuel pump** to carburetor	1		2
204	SA-68	**COVER PLATE** for valve tappet inspection	1		4
205	SA-109	**COVER** for oil pump trough	1		1
206	SD-35	**RETAINER** for crankshaft oil seal, take-off end	1		1
207	SD-39-1	**RETAINER** for crankshaft oil seal, flywheel end	1		1
208	SD-312	**NAME PLATE** **NOTE:** When ordering name plate, give Model, Specification and Serial Numbers for correct stamping.	1		1
209	SE-3	**FLYWHEEL SCREEN** (Standard)	1		4
		SE-3-2 (with 5-1/8" dia. hole) for engines with generator drive pulley	1		4
210	SE-217	**FLYWHEEL AIR SHROUD** **SE-217-F** for starter and generator. **SE-217-H** for engines with starter only, or starter and flywheel alternator, beginning with Serial No. 3,252,140. **SE-217A-1** for starter and generator on engines to and including Serial No. 3,252,139.	1	8	
211	SE-218	**COVER** for air shroud	1		[illegible]
212	T-100	**GOVERNOR ASSEMBLY,** complete	1	2	
213	TC-322E-S1	**GOVERNOR FLYWEIGHT ASSEMBLY** Includes **TC-328-D** thrust pin.	2		1⅓
214	TC-388-2	**GOVERNOR SHAFT**	1		3
215	TC-389-A-1	**GOVERNOR GEAR BUSHING** TC-389-1, replaced by TC-389A-1.	1		2
216	TC-391-B	**THRUST SLEEVE** and **BEARING** For governor.	1		2
217	TC-453	**GOVERNOR LEVER**	1		1
218	TC-454	**PIN** for governor adjusting screw	1		1
220	U-212	**STARTING CRANK**	1	1	8
221	UC-75-S1	**STARTING CRANK NUT ASSEMBLY** Consisting of: 1 PA-333 Pin 1 UC-75 Cranknut	1	1	
223	VB-198-A	**GOVERNOR YOKE** and **FULCRUM PIN ASSEMBLY** Consisting of: 1 [illegible]-50 [illegible] Ring 1 TC-452 Fulcrum pin 1 VB-198 Yoke 1 PA-367 Roll pin	1		3
224	VE-683	**CONTROL ROD** to carburetor	1		1

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
225	WD-66-S1	**EXHAUST MUFFLER** with LJ-312 pipe nipple **WD-66** (less pipe nipple)	1	1	8
226	WE-417-S1	**FUEL TANK** with **RC-122** cap WE-344 with RC-77 cap, replaced by WE-417.	1	3	
227	XB-98	**COLLAR BOLT,** ½"-13 thread x 1¼" long For crankcase to engine base mounting.	4	2	
228	XK-7	**PIPE PLUG,** ¼" square head 2-for oil filler and lever. 2-for oil drain.	4		2
230	Y-107B-S1	**MAGNETO,** "Fairbanks-Morse" No. FMXD1B7B1 with gear **YQ-7** Points and condenser kit. **YQ-4** Overhaul kit. Y-107A-S1, replaced by Y-107B-S1.	1	4	12
	Optional Y-108B-S1	**MAGNETO,** "Wico" No. XH-2523B, with gear **YQ-5** Points and condenser kit. **YQ-2** Overhaul kit. Y-108A-S1, replaced by Y-108B-S1.		4	

NOTE: These engines are equipped with either a 'Fairbanks-Morse' or 'Wico' magneto. See magneto bulletins in back of manual for service replacement parts list.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
231	YD-20	**RUBBER NIPPLE** For magneto tower.	1		1
232	YD-154-S1	**SPARK PLUG,** 18mm, Champion No. D-21	1		3
233	YL-339-24	**IGNITION CABLE ASSEMBLY**	1		4
		STANDARD HARDWARE			
	PA-367	**ROLL PIN,** 1/8 x 3/4" long For governor yoke mounting. **XH-1,** No. 0 x 3/4" taper pin, replaced by PA-367 (not interchangeable).	1		1
	PB-184	**SCREW,** 1/4"-28 thread x 5/8" long, hexagon head, self locking For mounting air cleaner bracket clip.	2		1
	PD-9	**NUT,** 1/4"-28 thread, hex., steel For air cleaner bracket clip.	1		1
	PD-11	**NUT,** 3/8"-24 thread, hexagon steel For cylinder head stud.	1		1
	PD-12	**NUT,** 7/16"-20 thread, hexagon steel For mounting cylinder block.	5		1
	PD-77	**NUT,** 1/4"-20 thread, hexagon steel 1-for governor lever fulcrum pin. 2-for fuel tank straps.	3		1
	PD-77-1	**NUT,** ¼"-20 thread, hexagon steel jam For governor adjusting screw pin.	1		1
	PD-79	**NUT,** 3/8"-16 thread, hexagon steel For magneto mounting screw (lower).	1		1
	PD-141	**NUT,** 5/16"-24 thread, hexagon steel For governor lever mounting.	1		1
	PE-3	**LOCKWASHER,** 1/4" spring lock 1-for tank bracket strap. 3-for air shroud to cylinder block. 2-for fuel tank straps. 2-for fuel pump mounting.	8		1

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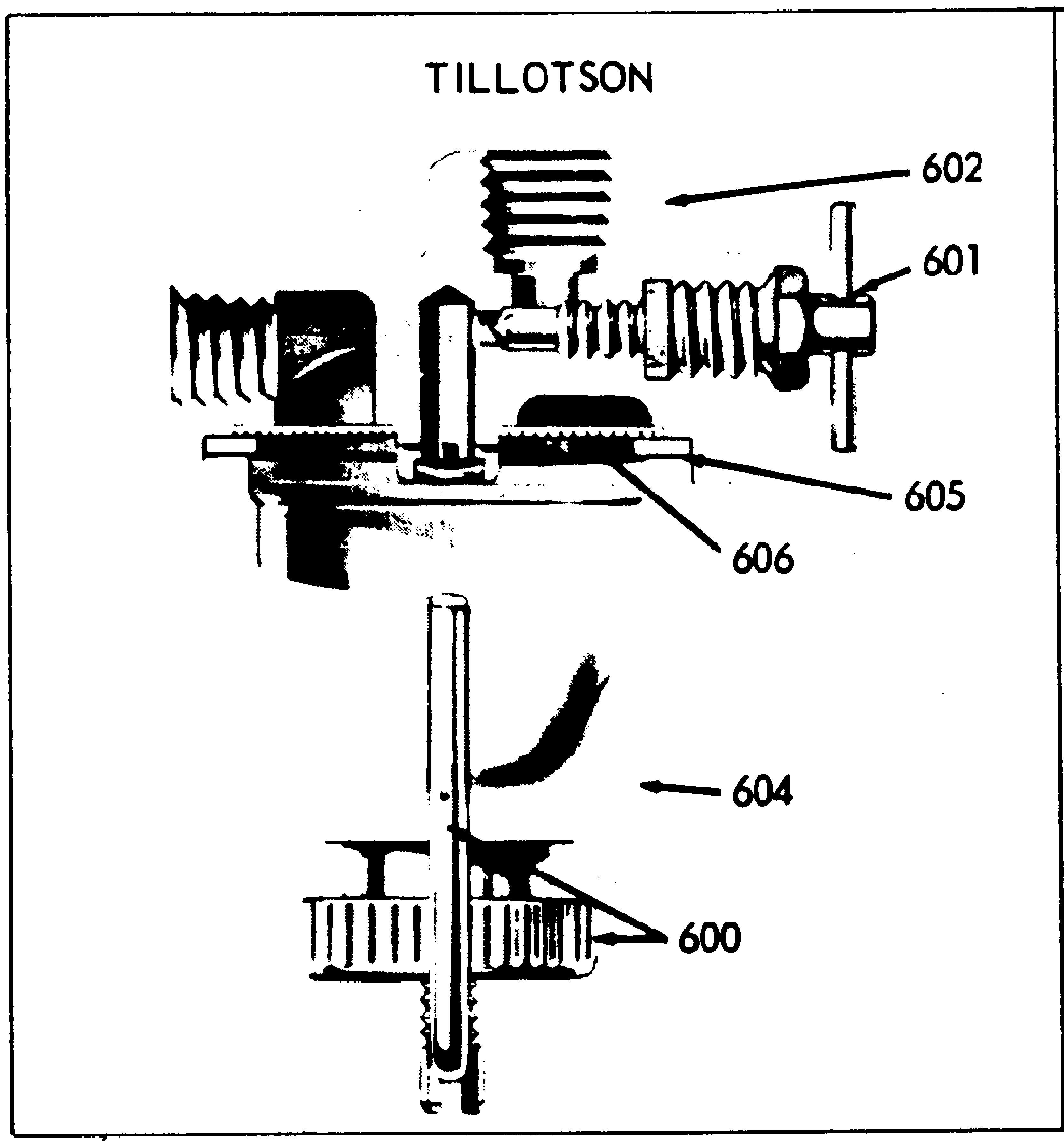
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

Model AGND Parts List

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	PE-4	**LOCKWWSHER,** 5/16" spring lock 2-for oil pump trough. 2-for carburetor mounting. 4-for bearing retainer plate, fan end. 2-for manifold to cylinder block.	10		1
	PE-5	**LOCKWASHER,** 3/8" spring lock 4-for main bearing plate, T.O. end. 3-for fuel tank bracket to case. 2-for magneto mounting. 1-for air shroud cover stud.	10		1
	PE-6	**LOCKWASHER,** 7/16" spring lock For mounting cylinder block.	5		1
	PE-7	**LOCKWASHER,** 1/2" spring lock For engine base mounting.	4		1
	PE-52	**LOCKWASHER,** 5/16" Internal 'Everlock' For governor lever mounting.	1		1
	PE-74	**LOCKWASHER,** 1/4" internal-external 'Everlock', plated For air cleaner bracket clip.	1		1
	PH-14	**WASHER,** 5/16" copper, plain For valve tappet inspection cover.	1		1
	PH-22	**WASHER,** 3/8" x 1/16" thick, steel, plain For cylinder head mounting.	6		1
	PH-22-A	**WASHER,** 3/8" x 3/32" thick, steel, plain For governor stop screw.	1		1
	RF-794	**NIPPLE,** 1/8" x ¾" long, close pipe For fuel strainer mounting. (optional)	1		1
	SA-13	**PLUG,** 3/4" expansion For camshaft pin hole.	1		1
	XA-33	**SCREW,** ¼"-20 x 3/8" long, ind. hex. hd. 2-for air shroud to cylinder block. 4-for flywheel screen mounting.	6		1
	XA-34	**SCREW,** ¼"-20 x 1/2" long, ind. hex. hd. For air shroud and fuel line clip.	1		1
	XA-67	**SCREW,** Parker-Kalon No. 4 – Type 'A', 1/4" long, stove-head, self-tapping 4-for instruction plate mounting. 2-for oil trough cover mounting.	6		1
	XA-69	**SCREW,** 1/4 x 20 x 2" long, round head For fuel tank straps. XA-74 (2-1/4"), replaced by XA-69.	2		1
	XD-4	**SCREW,** ¼"-30 x ½" long, hex. head For fuel tank bracket strap.	1		1
	XD-5	**SCREW,** ¼"-20 x 5/8" long, hex. head For fuel pump mounting.	1		1
	XD-8	**SCREW,** ¼"-20 x 1¼" long, hex. head For air cleaner bracket clamp.	1		1
	XD-15	**SCREW,** 5/16"-18 x ¾" long, hex. head 2-for oil pump trough. 4-for bearing retainer plate, fan end.	6		1
	XD-16	**SCREW,** 5/16"-18 x 7/8" long, hex. hd. 2-for carburetor mounting. 2-for manifold to cylinder block.	4		1
	XD-27	**SCREW,** 3/8"-16 x 1" long, hex. head For fuel tank bracket to case.	3		1
	XD-28	**SCREW,** 3/8"-16 x 1-1/8" long, hex. hd. For main bearing plate, T.O. end. XD-27, replaced by XD-28.	4		1
	XD-29	**SCREW,** 3/8"-16 x 1¼" long, hex. head (special hardness) For mounting cylinder head.	2		1
	XD-30	**SCREW,** 3/8"-16 x 1½" long, hex. head (special hardness) For mounting cylinder head.	3		1
	XD-34	**SCREW,** 3/8"-16 x 2½" long, hex. head For mounting magneto (upper hole).	1		1
	XD-77	**SCREW,** 3/8"-16 x 3" long, hex. head For mounting magneto (lower hole).	1		1
	XD-148	**SCREW,** 5/16"-18 x 1-5/8" long, hex. hd. For valve tappet inspection cover.	1		1
	XI-32	**COTTER PIN,** 3/64" x 3/8" long For governor control rod.	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

LP-43 FUEL STRAINER ASSEMBLIES



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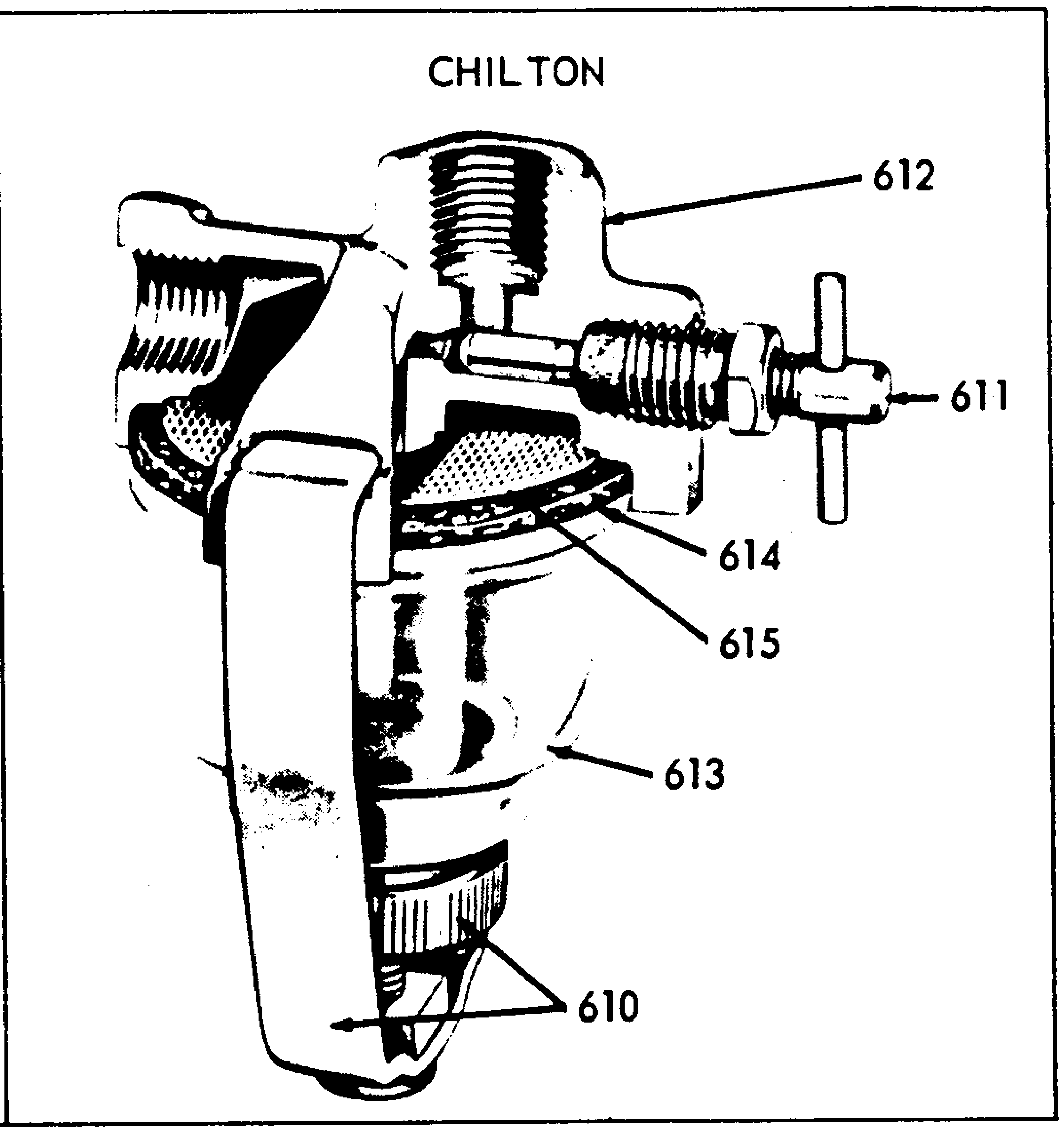

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The **LP-43** small fuel strainer is furnished by either the **TILLOTSON** or **CHILTON** Companies. The strainers are interchangeable as complete units, but only the glass bowl, gasket and screen (**LQ-31** Kit) are interchangeable as service replacement parts.

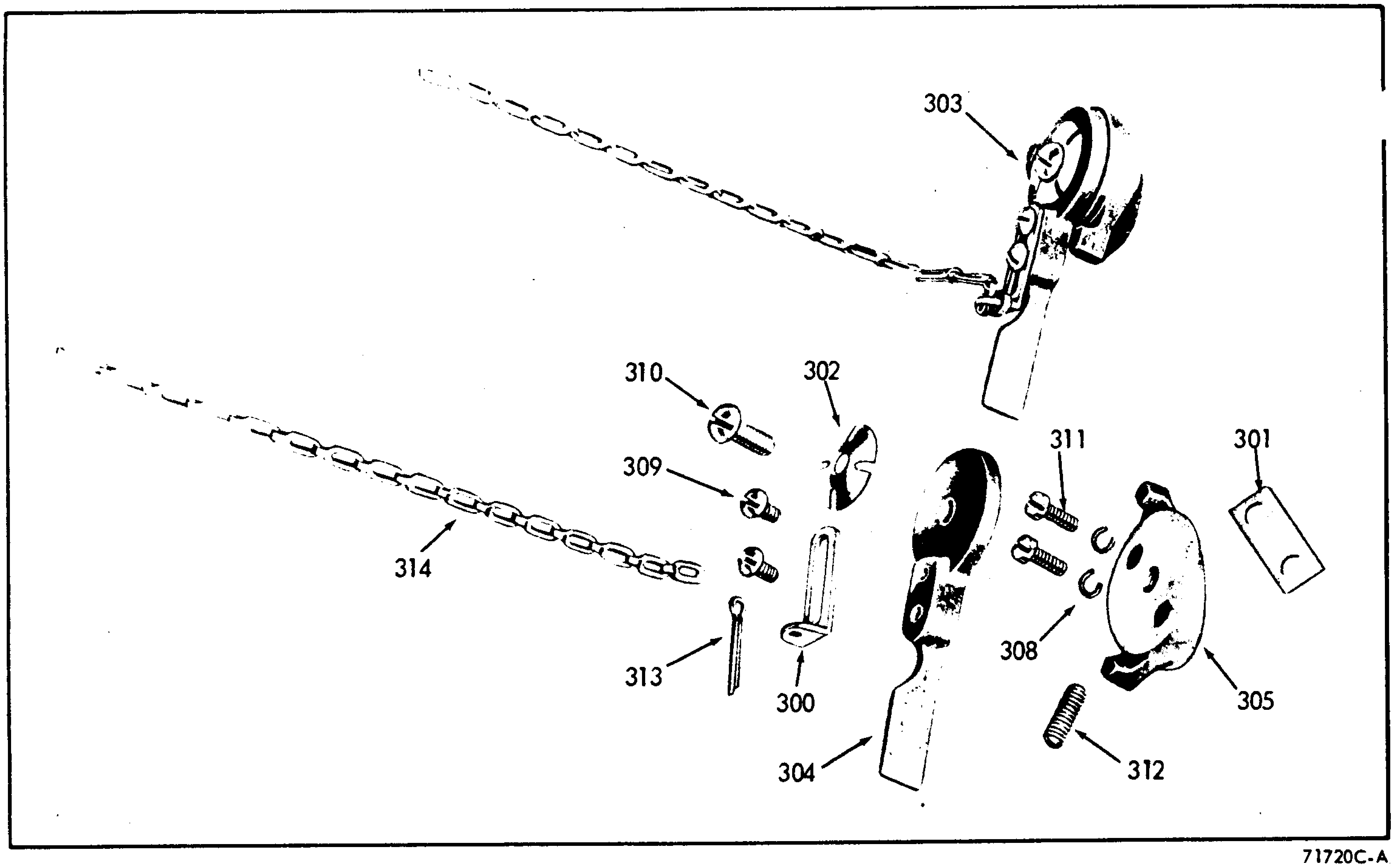
NOTE: Code number 75 or 17, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	OW-480-T	**TILLOTSON FUEL STRAINER ASSEMBLY** – Order (Wisconsin **LP-43**)	1		6
600	75-07766	**CLAMP WIRE** and **NUT ASSEMBLY**	1		1
601	75-07769	**NEEDLE VALVE ASSEMBLY** Includes Packing.	1		1
602	75-07770	**COVER**	1		2
	LQ-31	**REPAIR PARTS KIT** Consisting of:	1		3
604		Glass Bowl	1		1
605		Gasket	1		1
606		Screen	1		1

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		– OPTIONAL –			
	830	**CHILTON FUEL STRAINER ASSEMBLY** – Order (Wisconsin **LP-43**)	1		6
610	17-830-15A	**BAIL ASSEMBLY**	1		2
611	17-830-C	**NEEDLE VALVE ASSEMBLY** Includes Packing.	1		1
612	17-830-1	**COVER**	1		2
	LQ-31	**REPAIR PARTS KIT** Consisting of:	1		3
613		Glass Bowl	1		1
614		Gasket	1		1
615		Screen	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

TT-53-B VARIABLE SPEED GOVERNOR CONTROL ASSEMBLY FOR MODEL AGND ENGINE



71720C-A

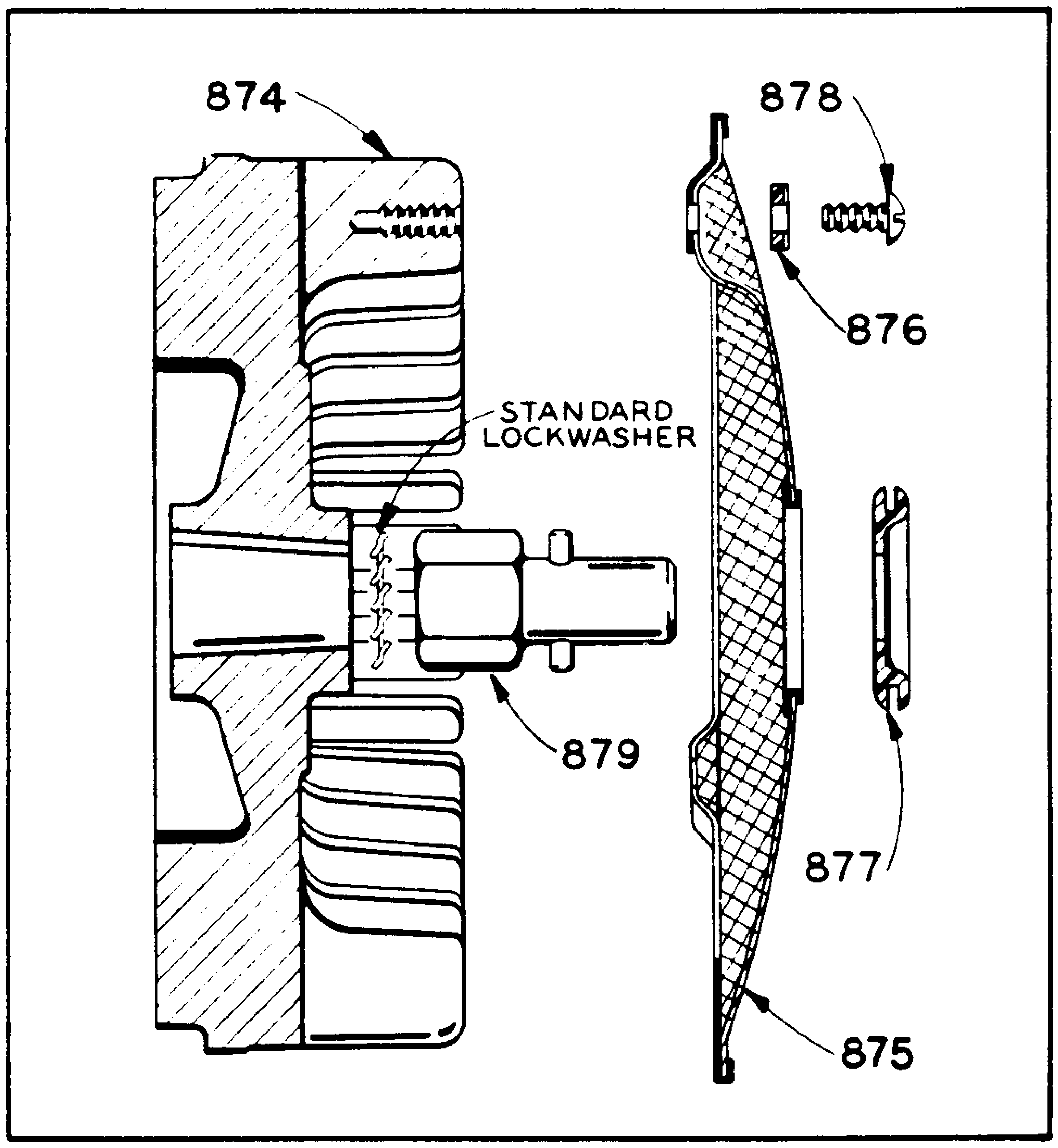
REF NO	PART NUMBER	DESCRIPTION	NO REQ	NET WEIGHT	
				LBS	OZ
300	PG-358-A	**ADJUSTING STRAP** for control chain PG-358 and PG-358-1, replaced by PG-358-A.	1		1
301	PG-848	**SPACER** for friction disc	1		1
302	PH-282	**FRICTION WASHER**	1		1
303	TT-53-B	**CONTROL ASSEMBLY** – Complete	1		10
304	VB-145	**CONTROL LEVER**	1		3
305	VC-29-2	**FRICTION DISC**	1		4
		STANDARD HARDWARE			
308	PE-14	**LOCKWASHER**, No. 10 Positive For mounting friction disc.	2		1
	PH-236	**PLAIN WASHER**, 3/16" I.D. x 1/2" O.D. x 1/16" thick, steel (Not illustrated) For adjusting strap screw.	1		1
309	XA-7	**SCREW**, No. 10-32 thread x 3/8" long, round head For adjusting strap mounting.	2		1
310	XA-35	**SCREW**, 1/4"-20 thread x 5/8" long, round head For control lever to friction disc.	1		1
311	XB-5	**SCREW**, No. 10-32 thread x 5/8" long, fillister head For mounting friction disc.	2		1
312	XE-47	**SET SCREW**, 1/4"-20 thread x 3/4" long For friction disc.	1		1
313	XI-7	**COTTER PIN**, 3/32" dia. x 3/4" long, steel For mounting chain to adjusting strap.	1		1
314		**No. 1/0 GALVANIZED SAFETY CHAIN** 14 links for speeds to and including 2600 R.P.M. 13 links for speeds above 2600 R.P.M.	1		2

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

FOR AGND ENGINE

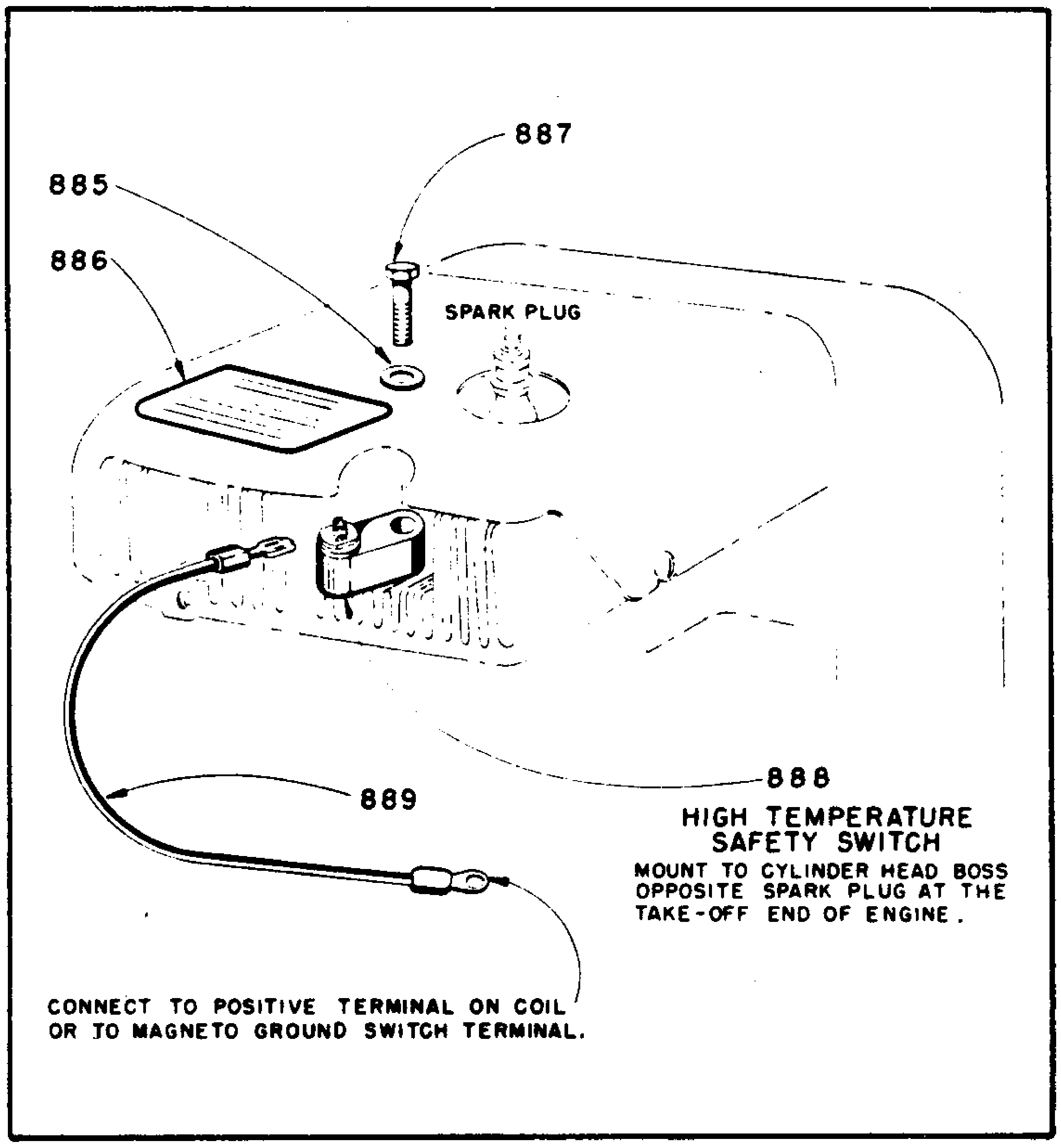
FLYWHEEL ROTATING SCREEN

SK-1174-A FOR MANUAL STARTING
SK-1174-G FOR STARTER AND GENERATOR DRIVE



Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
874	NC-145G-8	**FLYWHEEL,** in place of standard flywheel (for manual starting).	1	34	
	NC-145J-1-S1	**FLYWHEEL ASSEMBLY** (for electric starter and generator drive) on engines beginning with Serial No. 3,252,140. Includes **GH-55** Ring Gear. **NC-145G-9-S1** flywheel for electric start engines, to and including Serial No. 3,252,139, and with **GH-46** Ring Gear.		35	
875	SE-201F-S2	**ROTATING SCREEN ASSEMBLY** for manual start engines. Consisting of:	1	2	
876		**PH-442** Washer	3		1
877		**PH-426** Grommet	1		1
		SE-201F Screen (not serviced separately)	1		
878		**XA-104** Lok-Thread screws	3		1
	SE-201H-S1	**ROTATING SCREEN** for engines with electric starter and generator drive (3-3/8" dia. hole for pulley).			
879	UC-75-S1	**STARTING CRANK NUT ASSEMBLY** (Part of standard engine). Consisting of: PA-333 Pin UC-75 Crank nut	1	1	

YC-66-D-S1 HIGH TEMPERATURE SAFETY SWITCH KIT



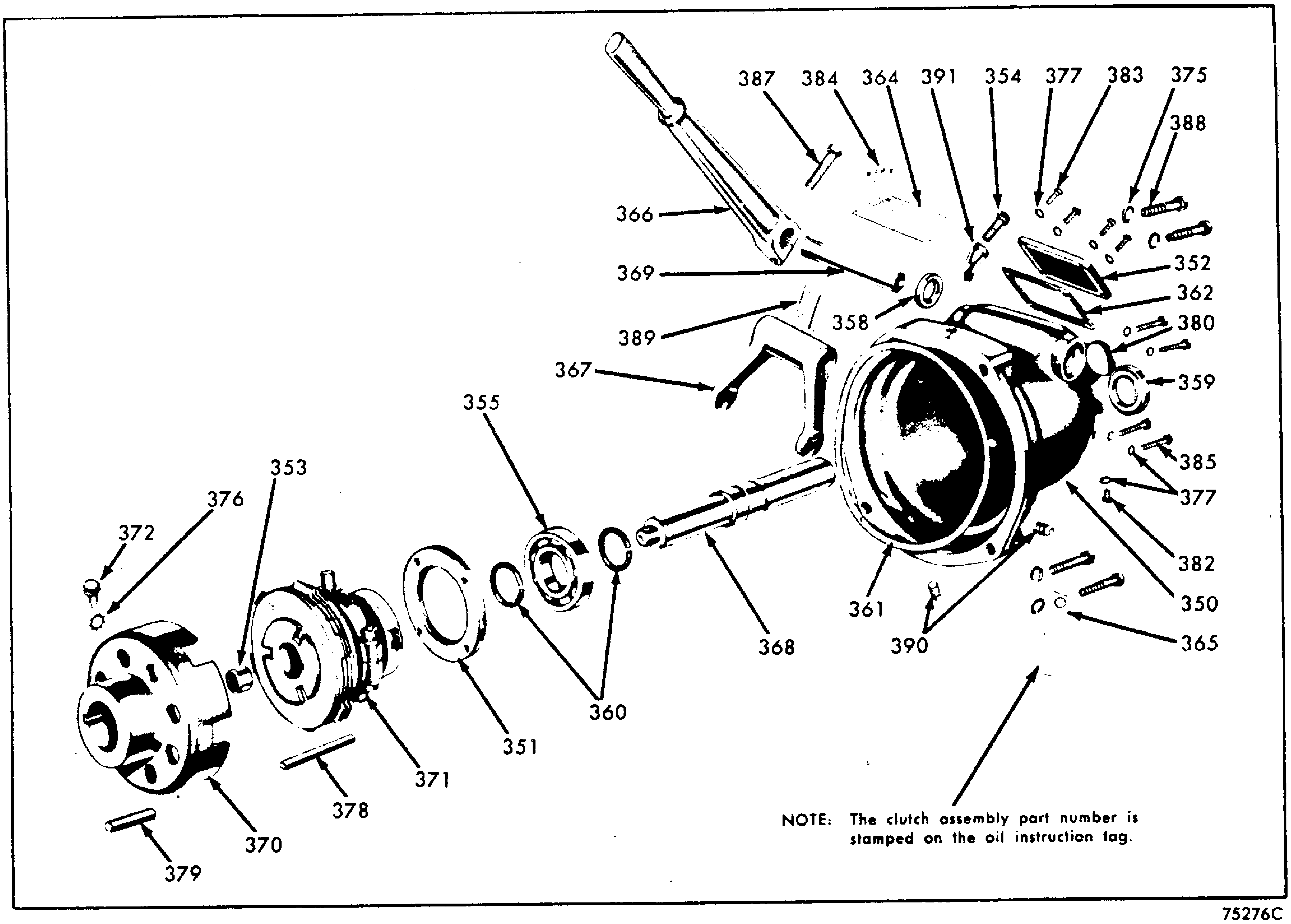
MOUNT TO CYLINDER HEAD BOSS OPPOSITE SPARK PLUG AT THE TAKE-OFF END OF ENGINE.

CONNECT TO POSITIVE TERMINAL ON COIL OR TO MAGNETO GROUND SWITCH TERMINAL.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	YC-66-D-S1	**HIGH TEMPERATURE SAFETY SWITCH KIT** – Complete........................ Consisting of:			9
885	PH-22	**WASHER,** 3/8" I.D., plain steel .... For switch to cylinder head mounting.	1		1
886	SD-233	**INSTRUCTION DECAL**...........................	1		1
887	XD-31	**CAPSCREW,** 3/8"-16 thread x 1¾" long, hexagon head .... For switch to cylinder head mounting.	1		1
888	YC-66-D	**HIGH TEMPERATURE SAFETY SWITCH** .... For replacement, order YC-66-D-S1 Kit.	1		3
889	YL-357-42	**WIRE ASSEMBLY,** 42" long, with terminals. (Wire coiled to suit all models).	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW-25-22 CLUTCH AND POWER TAKE-OFF ASSEMBLY FOR AGND ENGINE



NOTE: The clutch assembly part number is stamped on the oil instruction tag.

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NOTE: Engines equipped with a clutch and power take-off assembly require a special main bearing plate, crankshaft and crankcase as follows:

BG-105-E-S2 MAIN BEARING PLATE ASSEMBLY (not illustrated) consisting of:
1 BG-105-E Bearing Plate
1 PH-364 Oil Seal
1 ME-66-1 Bearing Cup

CA-73-2-S3 CRANKSHAFT ASSEMBLY (not illustrated) consisting of:
1 CA-73-2 Crankshaft
1 ME-115 Bearing
1 PL-55 Key
1 GA-30-B Gear
2 ME-66 Bearings

THE DASH NUMBER OF THE CRANKCASE PART NUMBER CAN BE FOUND STAMPED ON THE FACE OF THE FUEL TANK MOUNTING PAD.

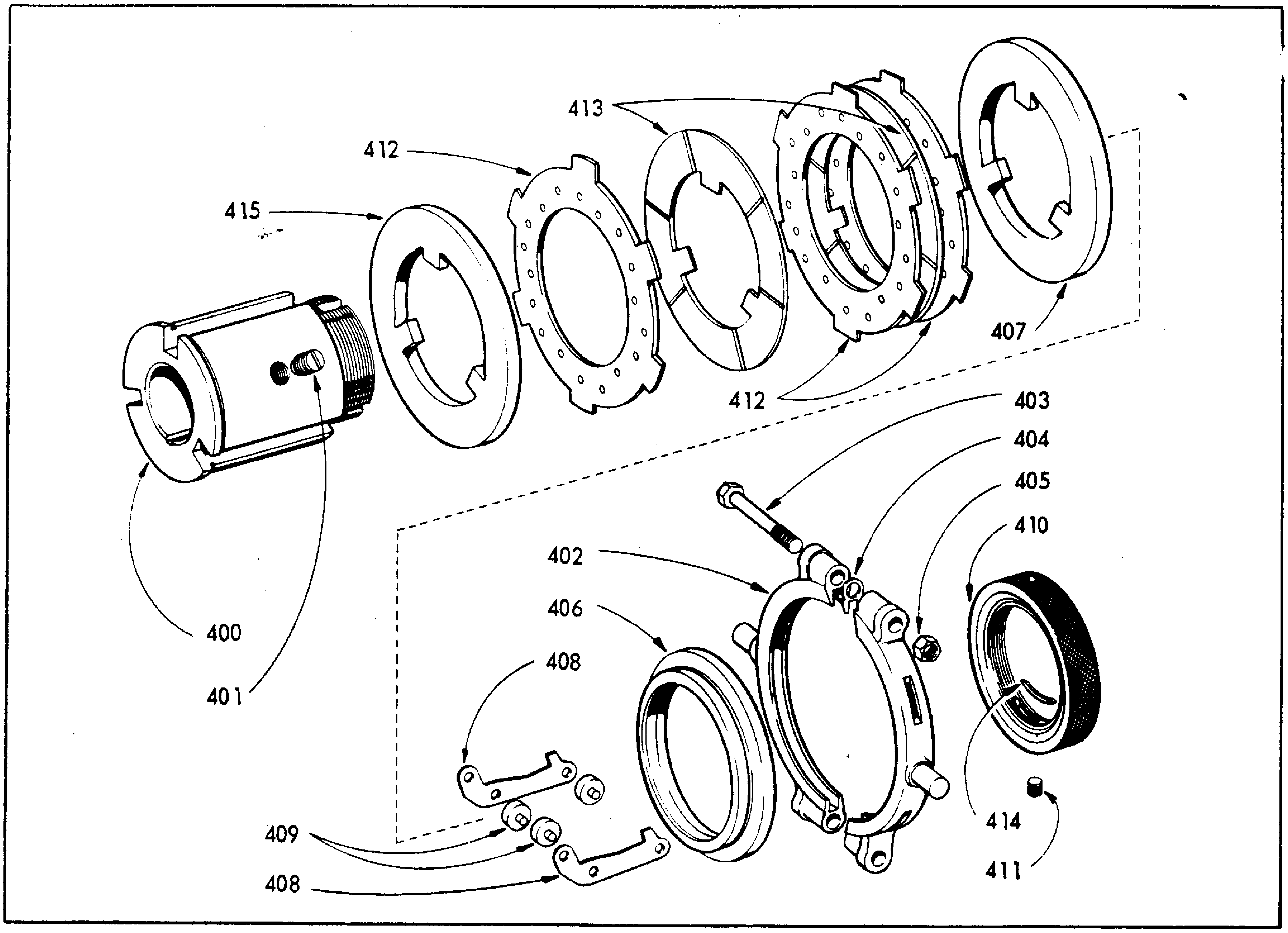
Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW-25-22 CLUTCH AND POWER TAKE-OFF ASSEMBLY FOR AGND ENGINE

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
	WW-25-22	**CLUTCH** and **POWER TAKE-OFF ASSEMBLY**	1	35	
350	BG-155D-4	**CLUTCH HOUSING**	1	16	
351	BG-156	**PLATE** for bearing retainer	1		8
352	BH-115-A	**COVER** for inspection hole BH-115, replaced by BH-115-A.	1		4
353	ME-115	**NEEDLE BEARING** for crankshaft	1		1
354	LO-44	**BREATHER**	1		1
355	ME-79-A	**BEARING** for take-off shaft, N.D. 7507	1		10
358	PH-234-A	**OIL SEAL** for shifter lever shaft	1		2
359	PH-280	**OIL SEAL** for take-off shaft	1		3
360	PK-149	**RETAINING RING** for bearing (3/32" thick) PK-56 Retaining Ring (3/16" thick)	2		1
361	QD-546	**CORK SEAL** for bearing plate	1		1
362	QD-551	**GASKET** for inspection hole cover	1		1
364	SD-59	**INSTRUCTION PLATE** For clutch adjusting.	1		1
365	SD-79	**TAG** for oil instruction	1		1
366	VB-55-1	**SHIFTER LEVER**	1	2	
367	VB-64-A	**SHIFTER YOKE**	1	1	4
368	WA-48-D	**TAKE-OFF SHAFT** Also order 2 PK-149 Retaining Rings.	1	3	
369	WA-61	**SHIFTER SHAFT**	1	1	
370	WC-219-1	**HUB** for clutch drive	1	3	4
371	WC-220-2	**CLUTCH**, Twin Disc 4½", No. X4937 **NOTE:** See Twin Disc illustration and parts list for clutch parts.	1	6	15
372	XD-14-2	**SET SCREW** for clutch drive hub	1		1
		STANDARD HARDWARE			
375	PE-6	**LOCKWASHER**, 7/16" Positive For housing mounting.	4		1
376	PE-46	**LOCKWASHER**, 5/16" External Everlock For drive hub set screw.	1		1
377	PH-30	**WASHER**, ¼" I.D. x 7/16" O.D. x 1/16" thick, plain copper 1-for oil return hole screw (Used on earlier engines.) 4-for bearing retainer plate. 4-for inspection hole cover.	9		1
378	PL-91	**KEY**, ¼" square x 2-7/8" long For clutch mounting.	1		1
379	PL-103	**KEY**, 5/16" square x 1-5/8" long For clutch drive hub mounting.	1		1
380	SA-58	**PLUG**, 1-3/8" expansion For clutch housing.	1		1
382	XA-32	**SCREW**, ¼"-20 thread x 5/16" long, round head To plug oil return hole (Used on earlier engines.)	1		1
383	XA-34	**SCREW**, ¼"-20 thread x ½" long, round head For sheet steel inspection cover. XA-35, 5/8" long for cast iron cover.	4		1
384	XA-100	**SCREW**, No. 4 x ¼" round head metallic drive For clutch adjusting plate. XA-68, No. 2 x ¼" Screw, replaced by XA-100.	4		1
385	XD-9	**SCREW**, ¼"-20 thread x 1½" long, hexagon head For bearing retainer plate.	4		1
387	XD-30	**SCREW**, 3/8"-16 thread x 1½" long, hexagon head For clamping shifter lever.	1		1
388	XD-130	**SCREW**, 7/16"-14 thread x 2¼" long, hexagon head For mounting housing.	4		2
389	PA-341	**ROLL PIN**, 1/4" dia. x 1-1/8" long For shifter yoke to shaft. XH-26, No. 4 x 1-3/8" long, taper pin, replaced by PA-341.	2		1
390	XK-2	**PLUG**, ¼" square head, pipe 1-for oil drain hole. 1-for oil level hole.	2		1
391	XK-77-A	**STREET ELL**, 1/8" x 45°, brass For mounting breather. XK-77, replaced by XK-77-A.	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

TWIN DISC 4½", No. X4937 CLUTCH ASSEMBLY
WISCONSIN MOTOR PART NUMBER WC-220-2



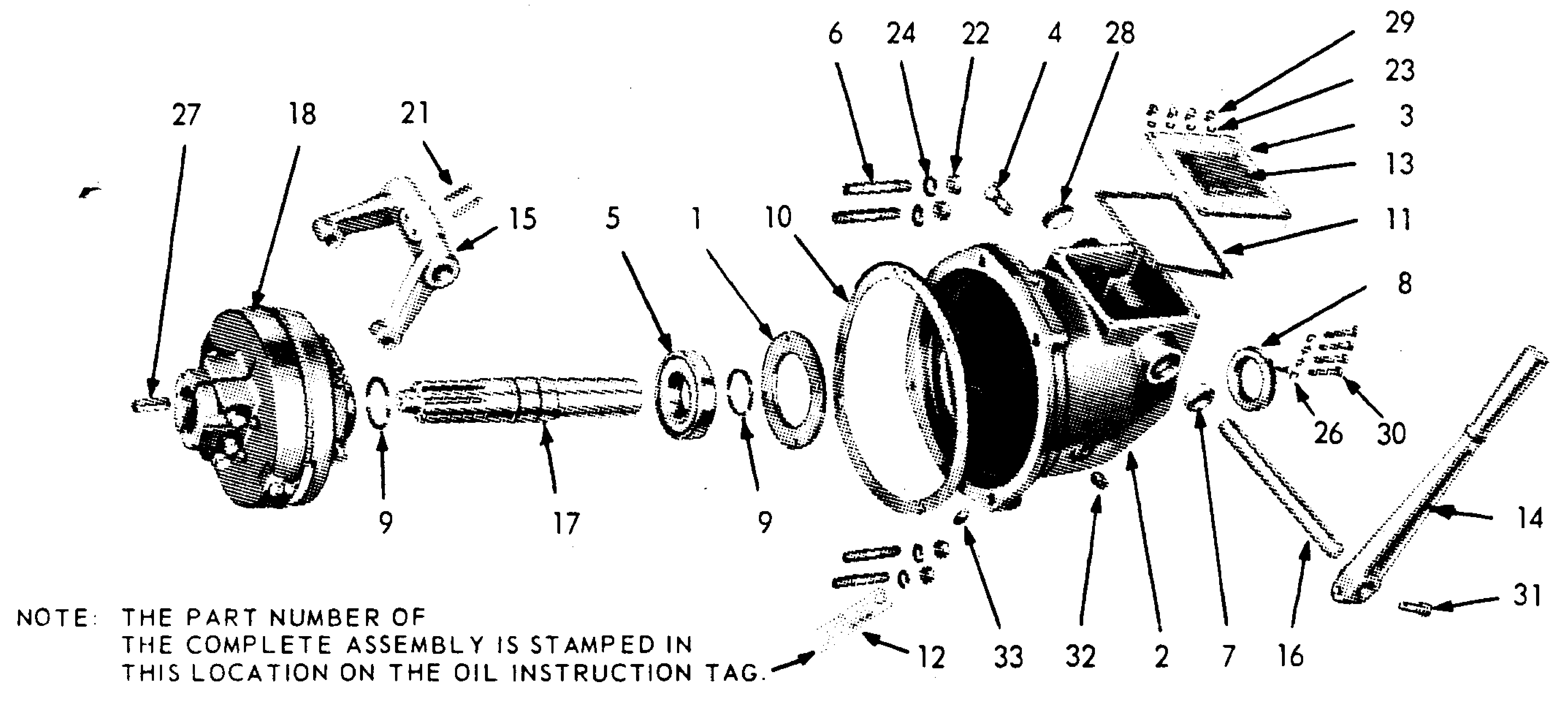
REPAIR PARTS LIST FOR X4937, MODEL V3045 CLUTCH
SPECIFICATION 29204 (REPLACES 13853 DUE TO HUB CHANGE–INTERCHANGEABLE)

NOTE: Code number 78, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
400	78-Z4956G	**HUB,** 1.1875"-1.1865" bore, ¼" x 1/8" keyway 4956D, replaced by 78-Z4956G.	1
401	78-M2042K	**SET SCREW** for hub, 3/8"-16 thread x 5/8" long, cut point	1
402	78-X4941A	**SLEEVE COLLAR ASSEMBLY** .... Includes:	1
403		**78-M2000T** Cap screw, 1/4"-28 thread x 2" long, hexagon head	2
404		**78-2710** Shim	2
405		**78-M1930A** Locknut, 1/4"-28 thread x 7/32" ..	2
406	78-A1495	**WEDGE SLEEVE**	1
407	78-A1493	**CLAMPING PLATE**	1
408	78-4957	**LEVER**	6
409	78-A1494	**LEVER ROLLER**	9

Ref. No.	Part Number	Description	No. Req.
410	78-A1496A	**LOCK and ADJUSTING NUT**	1
411	78-M2041AQ	**SET SCREW** for adjusting nut	1
412	78-4958	**DRIVE PLATE**	3
413	78-4955	**DRIVEN PLATE**	2
414	78-A2260	**LOCKWIRE**	1
415	78-A1493C	**BACK CLAMPING PLATE**	1

When ordering parts, kindly advise clutch specification number.



NOTE: THE PART NUMBER OF THE COMPLETE ASSEMBLY IS STAMPED IN THIS LOCATION ON THE OIL INSTRUCTION TAG.

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NOTE: Engines equipped with a clutch take-off assembly require a special main bearing plate assembly, crankshaft and crankcase as follows:

BG 105 E 3 S 2 **MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:

1 BG 105 E 3 Plate 1 PH 364 Oil Seal 1 ME 66-1 Bearing Cup

CRANKCASE ASSEMBLY (Not illustrated) Order by giving the **MODEL, SPECIFICATION** and **SERIAL NUMBERS** of the engine.

CA 73-49 S 1 **CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:

1 CA 73-49 Crankshaft 1 GA 30 B Gear 2 ME 66 Bearings 1 PL 55 Key

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
	WW 61 K	**CLUTCH TAKE-OFF ASSEMBLY –** Complete	1	40	
1	**BG 225 A**	**BEARING RETAINER PLATE**	1		8
2	**BG 234-2**	**HOUSING**	1	15	
3	**BH 158**	**COVER** for housing	1		10
4	**LO 44 A**	**BREATHER ASSEMBLY**	1		1
5	**ME 36 B**	**BEARING,** take-off end	1	1	
6	**PC 392**	**STUDS** for mounting hous'g to crankcase	4		2
7	**PH 234 A**	**OIL SEAL,** yoke shaft	1		1
8	**PH 344 A**	**OIL SEAL,** take-off end, housing	1		3
9	**PK 148**	**SNAP RING,** T.O. end, bearing retainer	2		1
10	**QD 546**	**CORK SEAL,** engine bearing plate	1		1
11	**QD 652**	**GASKET** for cover	1		1
12	**SD 79**	**OIL INSTRUCTION TAG**	1		1
13	**SD 125 A**	**INSTRUCTION PLATE**	1		2
14	**VB 55-1**	**SHIFTING LEVER**	1	2	
15	**VB 64 A**	**CLUTCH YOKE**	1	1	3
16	**WA 61**	**YOKE SHAFT,** order 2 PK 148 Snap rings	1		14
17	**WA 96 B**	**CLUTCH T.O. SHAFT**	1	3	12
18	**WC 288 A**	**CLUTCH ASSEMBLY** Rockford Drilling Model 5½ L.O.C. No. CLA 1467 AF. **NOTE:** See illustration and service parts list of clutch on following page.	1	12	

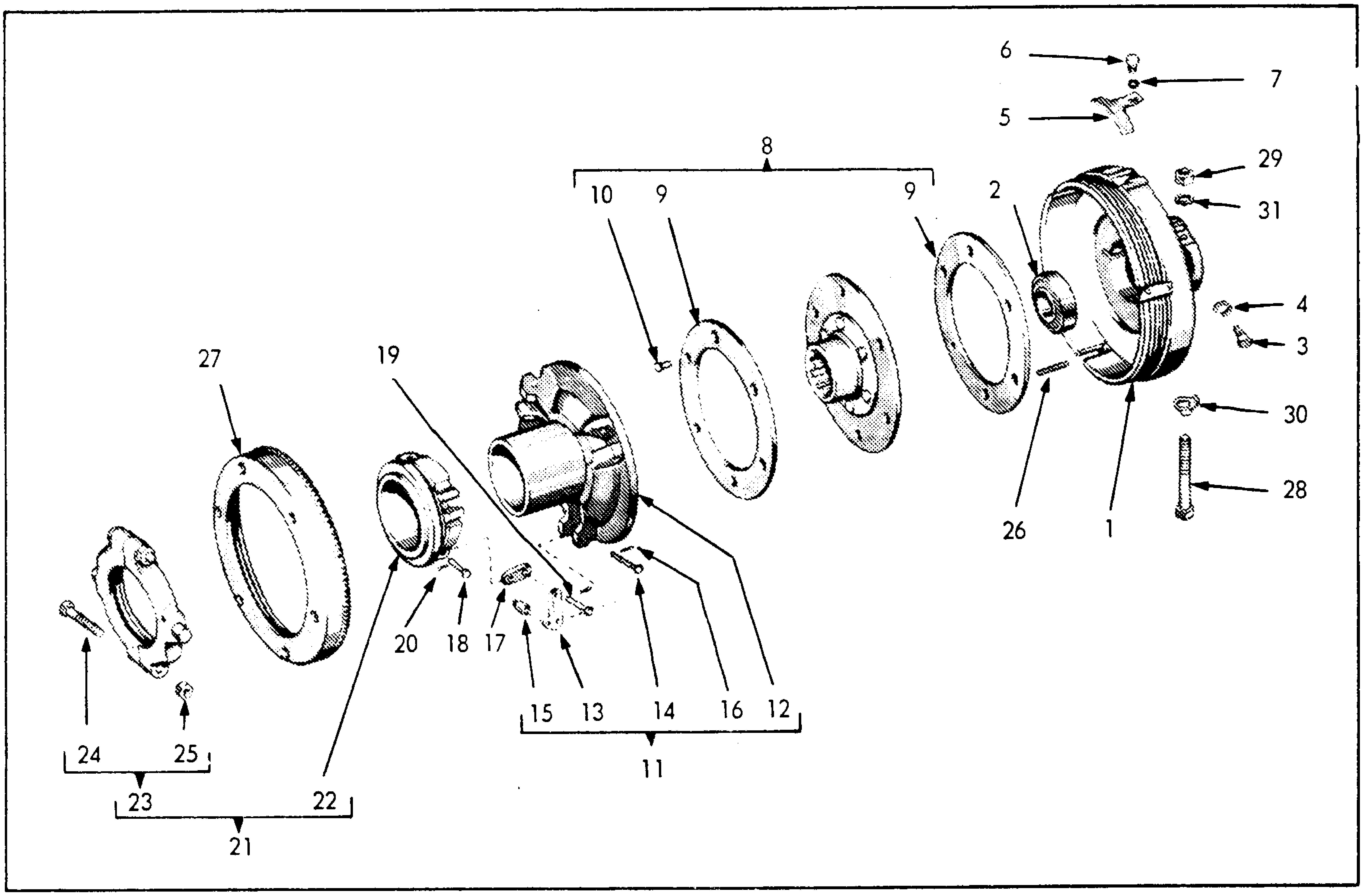
Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		STANDARD HARDWARE			
21	**PA 341**	**ROLL PIN,** 1/4" x 1-1/8" long For clutch yoke.	2		1
22	**PD 12**	**NUT,** 7/16"-20 thread, hexagon steel, For mounting clutch housing.	4		1
23	**PE 3**	**LOCKWASHER,** 1/4" spring lock, cover to housing	4		1
24	**PE 6**	**LOCKWASHER,** 7/16" spring lock For mounting clutch housing.	4		1
26	**PH 30 A**	**WASHER,** 1/4" plain, steel For bearing retainer plate to housing.	4		1
27	**PL 140**	**KEY,** 5/16" square x 1-1/8" long, steel For mounting clutch to crankshaft.	1		1
28	**SA 58**	**PLUG,** 1-3/8", shifter shaft hole	1		1
29	**XA 34**	**SCREW,** 1/4"-20 x 1/2" ind. hex. head For cover to housing mounting.	4		1
30	**XD 8**	**SCREW,** 1½4"-20 x 1-1/4" hex. head Bearing retainer plate to housing.	4		1
31	**XD 30**	**SCREW,** 3/8"-16 x 1-1/2" hex. head For shifter lever clamp.	1		1
32	**XK 1**	**PIPE PLUG,** 1/8" square head For oil level hole.	2		1
33	**XK 2**	**PIPE PLUG,** 1/4" square head For oil drain hole.	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WC 288 A CLUTCH ASSEMBLY

Rockford No. CLA 1467 AF



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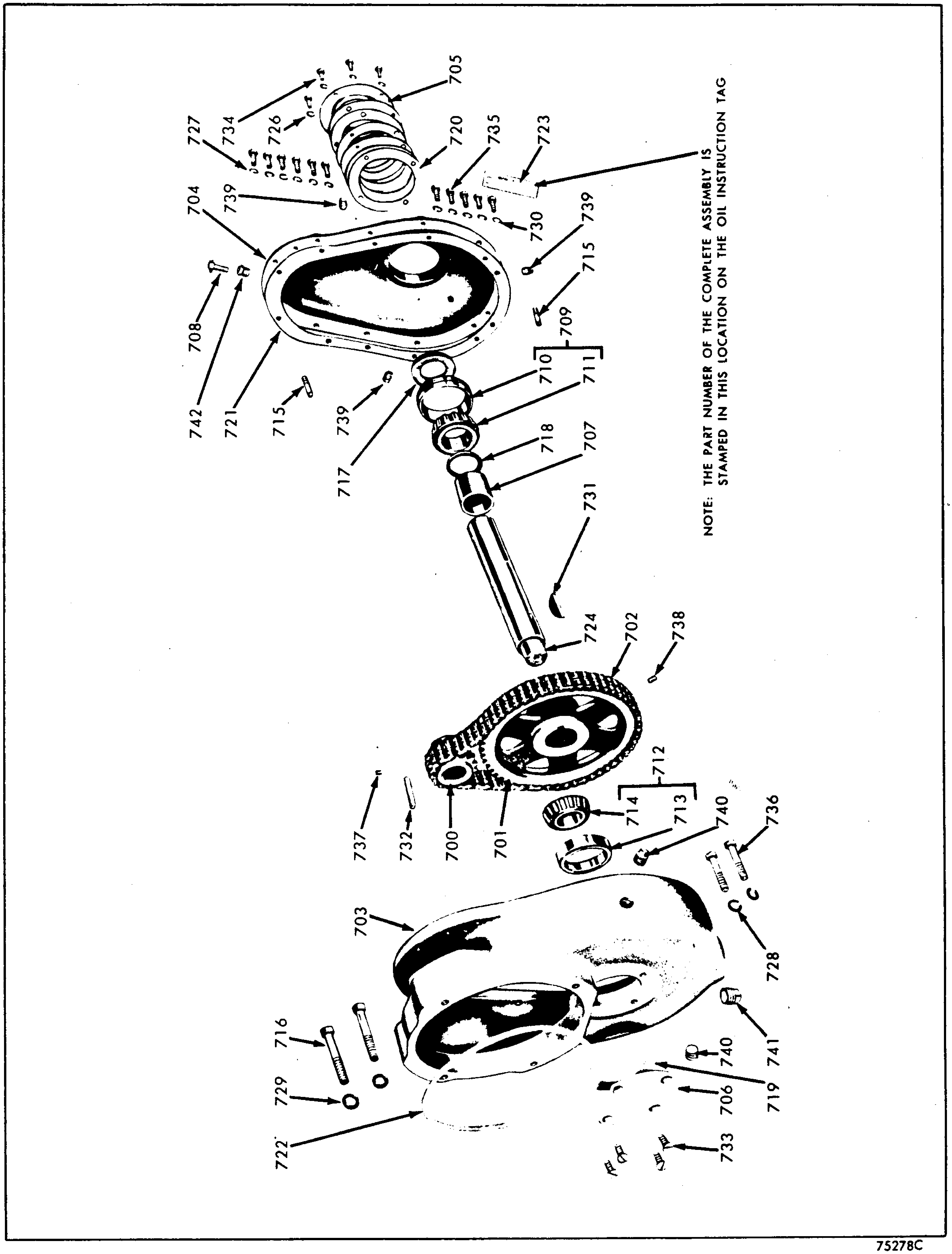
Ref. No.	Part Number	Description	No. Req
1	63 CL 5210-1	**CLUTCH HOUSING**	1
2	ME 189	**PILOT BEARING**	1
3	XD 14-2	**SCREW,** 5/16"-18 x 5/8" Dog point hex. hd.	1
4	PE 46	**LOCKWASHER,** 5/16" external tooth	1
5	63 CL 4973	**ADJUSTING LOCK**	1
6	63 CL 8807-1	**SCREW,** 1/4"-20 x 3/8" slotted hex. head	1
7	63 CL 3468	**LOCKWASHER,** 1/4" Shakeproof	1
8	63 UCL 1-1244-10	**DRIVEN MEMBER ASSEMBLY**	1
		Consisting of:	
	*	Splined center and plate assembly	
9		63 CL 5321-40 Facing (Thermoid DK)	2
10		63 CL 1011 Tubular rivets (brass)	6
11	63 UCL 5146-1A	**PRESSURE PLATE** and **LEVER ASSEM.**	1
		Consisting of:	
12		63 UCL 5146-1 Pressure plate assembly	1
13		63 CL 5544 Lever	6
14		63 CL 5156 Lever pin	3
15		63 LM 408 Roller	3
16		63 CL 5092 Cotter pin, 1/16" x 3/8"	3
17	63 CL 4776	**CONNECTING LINK**	6
18	63 CL 5153	**LINK PIN,** long	3
19	63 CL 5152	**LINK PIN,** short	3
20	63 CL 5092	**COTTER PIN,** 1/16" x 3/8"	6
21	63 UCL 4-5145	**RELEASE SLEEVE ASSEMBLY**	1
		Consisting of:	
22		63 CL 5145 Release sleeve	1
23		63 UCL 6-5144 Release bearing assem.	1
		Consisting of:	
		Release bearing	
24		63 CL 3335-1 Screw, 5/16"-24 x 1-3/4" hexagon head	2
25		63 CL 7356 Nut, 5/16"-24 elastic stop	2
26	63 CL 5087	**RETURN SPRING**	3
27	63 CL 5147	**ADJUSTING RING**	1
28	63 CL 5318	**SCREW,** 3/8"-24 x 2-1/2" hexagon head	2
29	63 CL 5319	**NUT,** 3/8"-24 hexagon	2
30	63 CL 5211	**SCREW LOCK**	1
31	63 PT 353	**LOCKWASHER,** 3/8" Positive	1
		(*) Not serviced separately from sub-assembly it is included in.	

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW-27-C ETC. REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

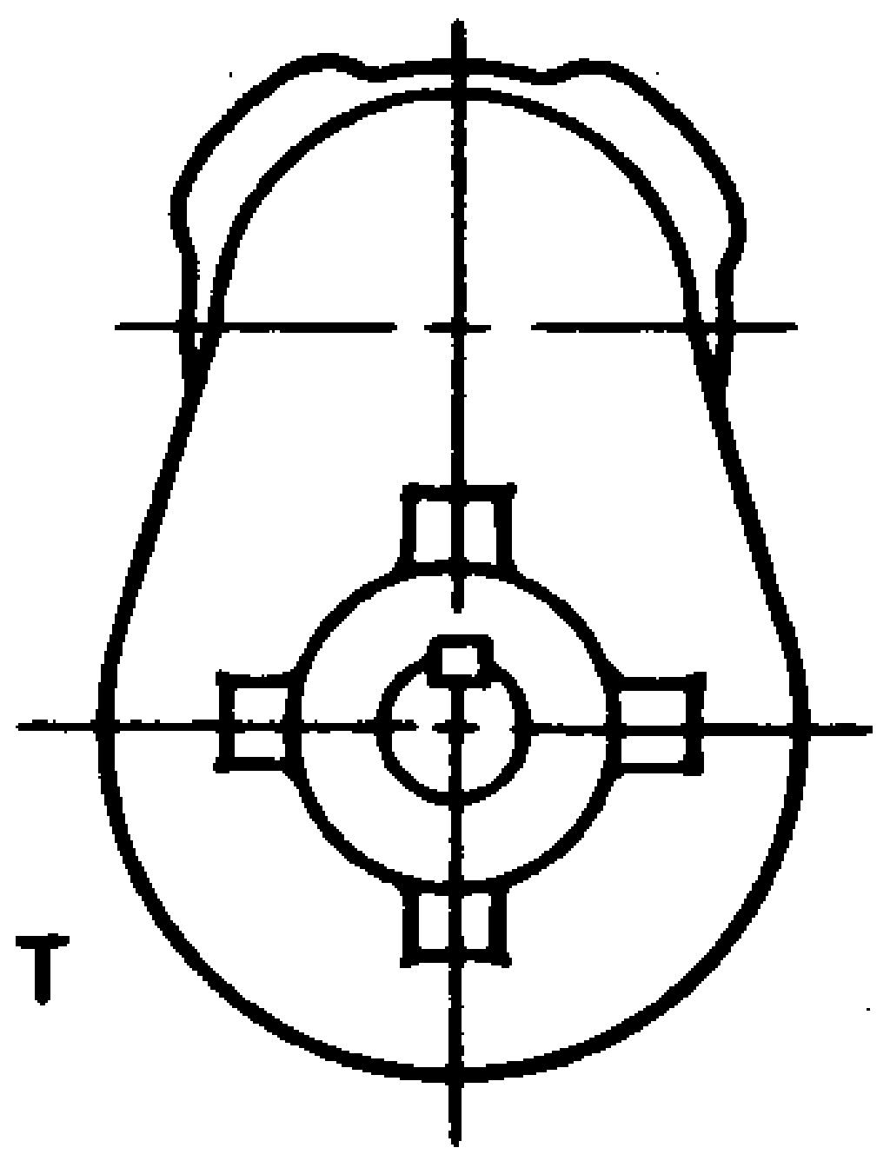
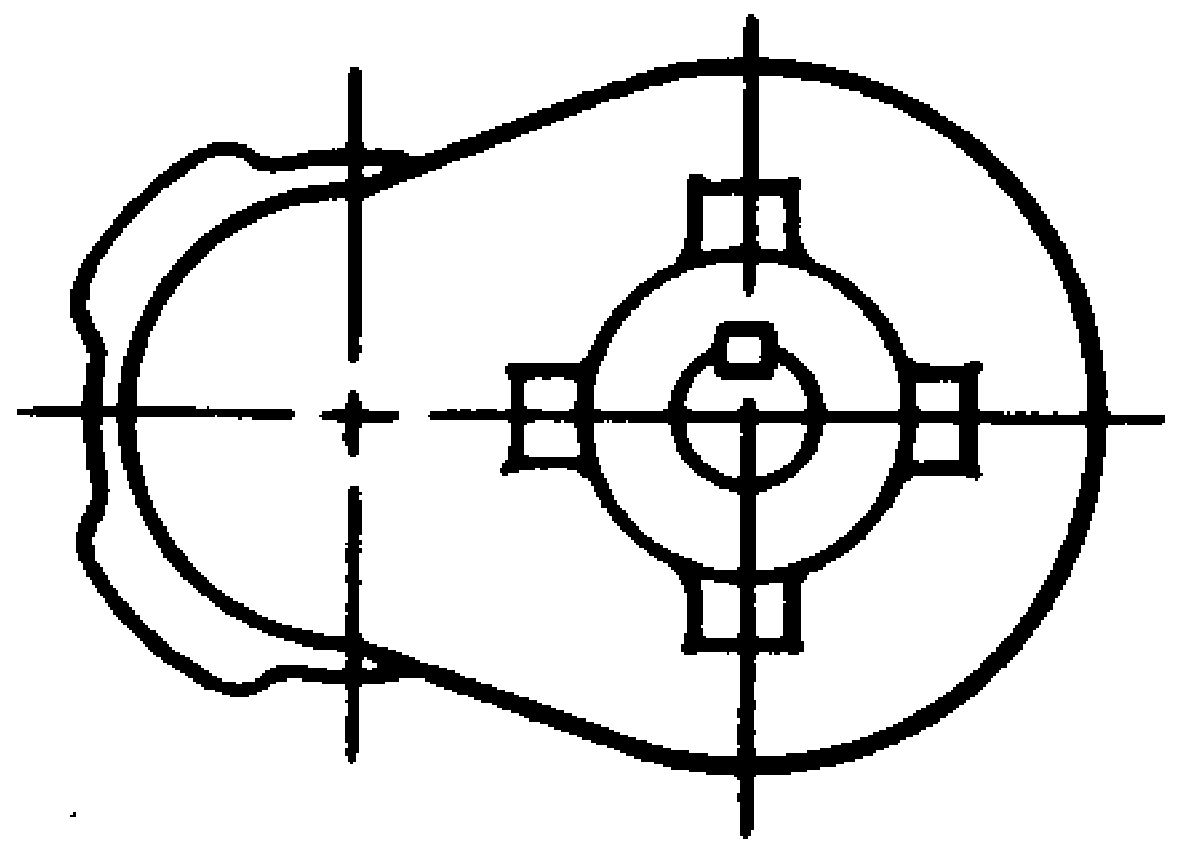
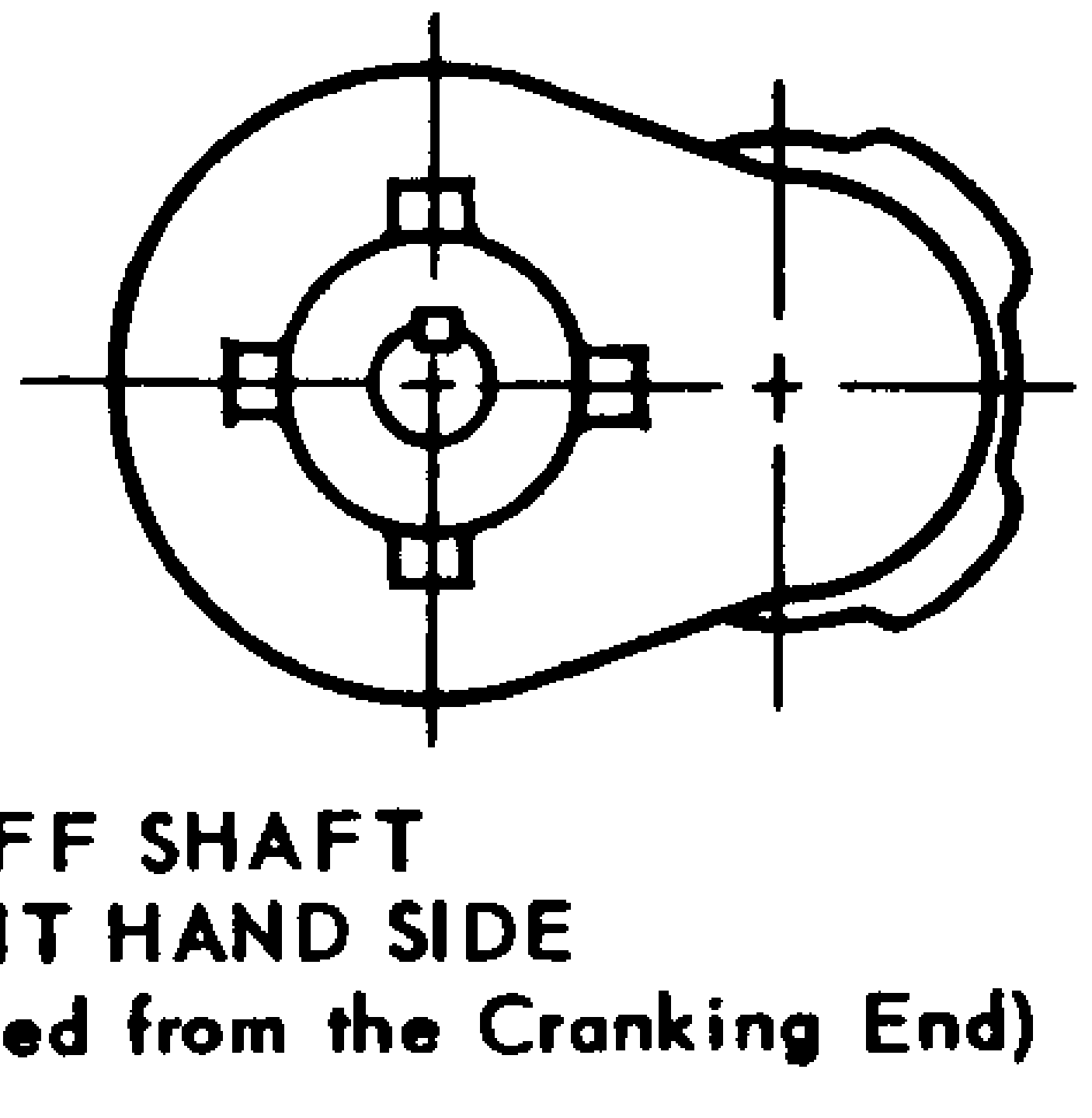
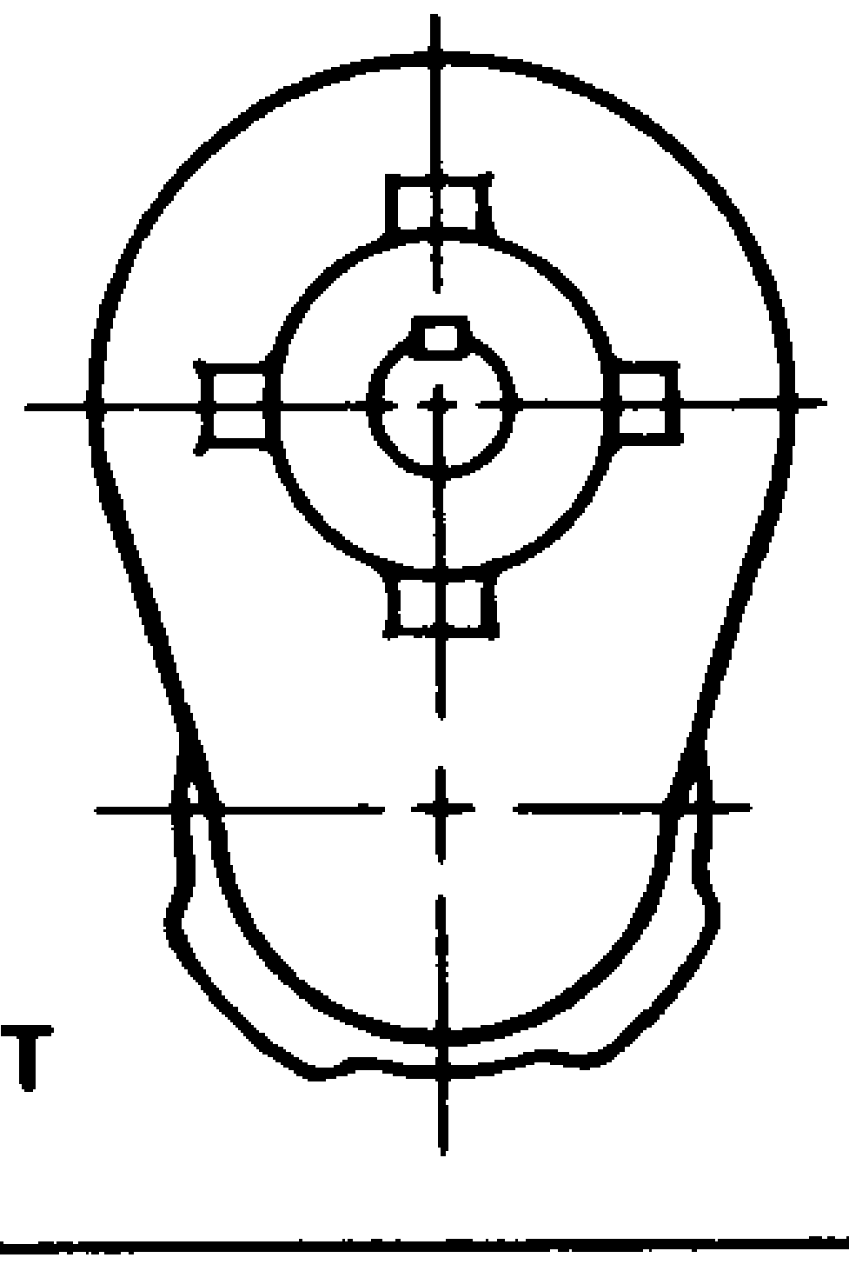


NOTE: THE PART NUMBER OF THE COMPLETE ASSEMBLY IS STAMPED IN THIS LOCATION ON THE OIL INSTRUCTION TAG

75278C

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW-27-C ETC. REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

Position of Take-off shaft is determined when viewing from cranking end of engine. (Views facing take-off end are shown.)	Assembly Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 700	Ref. No. 701	Ref. No. 702	Ref. No. 703	Ref. No. 704
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.	Housing Cover Part No.
 TAKE-OFF SHAFT BELOW	WW-27-C	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	....	BG-149-B	BH-119
	WW-27-C-1	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	....	BG-149-B	BH-119
	WW-27-C-2	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	....	BG-149-B	BH-119
	WW-27-C-3	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B	BH-119
	WW-27-C-4	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B	BH-119
	WW-27-C-5	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B	BH-119
 TAKE-OFF SHAFT ON LEFT HAND SIDE (as Viewed from the Cranking End)	WW-27-C-6	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	....	BG-149-B-2	BH-119-1
	WW-27-C-7	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	....	BG-149-B-2	BH-119-1
	WW-27-C-8	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	....	BG-149-B-2	BH-119-1
	WW-27-C-9	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-2	BH-119-1
	WW-27-C-10	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-2	BH-119-1
	WW-27-C-11	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-2	BH-119-1
 TAKE-OFF SHAFT ON RIGHT HAND SIDE (as Viewed from the Cranking End)	WW-27-C-12	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	....	BG-149-B-1	BH-119-2
	WW-27-C-13	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	....	BG-149-B-1	BH-119-2
	WW-27-C-14	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	....	BG-149-B-1	BH-119-2
	WW-27-C-15	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-1	BH-119-2
	WW-27-C-16	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-1	BH-119-2
	WW-27-C-17	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-1	BH-119-2
 TAKE-OFF SHAFT ON TOP	WW-27-C-18	2.07 to 1	Counter Engine-Wise	GG-66-3	GG-67-1	....	BG-149-B-3	BH-119-3
	WW-27-C-19	3.00 to 1	Counter Engine-Wise	GG-79-1	GG-77-1	....	BG-149-B-3	BH-119-3
	WW-27-C-20	3.84 to 1	Counter Engine-Wise	GG-80-1	GG-69-1	....	BG-149-B-3	BH-119-3
	WW-27-C-21	2.00 to 1	Engine-Wise	GG-81	GG-71	GJ-8	BG-149-B-3	BH-119-3
	WW-27-C-22	2.67 to 1	Engine-Wise	GG-82	GG-71	GJ-9	BG-149-B-3	BH-119-3
	WW-27-C-23	3.79 to 1	Engine-Wise	GG-83	GG-73	GJ-10	BG-149-B-3	BH-119-3

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
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WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

Part Number	Net Wt.	
	Lb	Oz
BG-149-B	22	
BG-149-B-1	22	
BG-149-B-2	22	
BG-149-B-3	22	
BH-119	14	
BH-119-1	14	
BH-119-2	14	
BH-119-3	14	
GG-66-3 (30 teeth)	2	12
GG-67-1 (62 teeth)	8	11
GG-69-1 (73 teeth)	10	15
GG-71 (40 teeth)	5	4
GG-73 (53 teeth)	7	10
GG-77-1 (69 teeth)	10	4
GG-79-1 (23 teeth)	2	
GG-80-1 (19 teeth)	1	4

Part Number	Net Wt.	
	Lb	Oz
GG-81 (20 teeth)	2	
GG-82 (15 teeth)	1	1
GG-83 (14 teeth)		15
GJ-8 (27" long)	1	13
GJ-9 (26" long)	1	12
GJ-10 (30" long)	2	
WW-27-C	66	
WW-27-C-1	68	
WW-27-C-2	67	
WW-27-C-3	62	
WW-27-C-4	61	
WW-27-C-5	63	
WW-27-C-6	66	
WW-27-C-7	68	
WW-27-C-8	67	

Part Number	Net Wt.	
	Lb	Oz
WW-27-C-9	62	
WW-27-C-10	61	
WW-27-C-11	63	
WW-27-C-12	66	
WW-27-C-13	68	
WW-27-C-14	67	
WW-27-C-15	62	
WW-27-C-16	61	
WW-27-C-17	63	
WW-27-C-18	66	
WW-27-C-19	68	
WW-27-C-20	67	
WW-27-C-21	62	
WW-27-C-22	61	
WW-27-C-23	63	

INTERCHANGEABLE PARTS FOR WW-27-C ETC. REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

NOTE: Engines equipped with a Reduction Gear Assembly require a special Main Bearing Plate Assembly, Crankshaft and Crankcase as follows:

BG-105-E-S2 **MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:
1 BG-105-E Bearing Plate 1 PH-364 Oil Seal 1 ME-66-1 Bearing Cup

CA-73-3-S1 **CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:
1 CA-73-3 Crankshaft 1 GA-30-B Gear 2 ME-66 Bearings 1 PL-55 Key

THE DASH NUMBER OF THE CRANKCASE PART NUMBER CAN BE FOUND STAMPED ON THE FACE OF THE FUEL TANK MOUNTING PAD.

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
705	BG-150	**PLATE** for outer bearing retainer	1	1	
706	BG-151	**PLATE** for inner bearing retainer	1		6
707	HF-265	**SPACER** for take-off shaft	1		3
708	LO-44	**BREATHER**	1		1
709	ME-76	**OUTER BEARING ASSEMBLY** Consisting of:	1	1	11
710		1 ME-76-1 Cup, Timken No. 3525			10
711		1 ME-76-2 Cone, Timken No. 3578		1	1
712	ME-77	**INNER BEARING ASSEMBLY** Consisting of:	1		15
713		1 ME-77-1 Cup, Timken No. 02820			6
714		1 ME-77-2 Cone, Timken No. 02877			9
715	PA-279	**DOWEL PIN** for cover to housing	2		1
716	XD-39	**SCREW**, 7/16"-14 thread x 2½" long, hexagon head For housing to crankcase, outer holes.	2		2

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
717	PH-202	**OIL SEAL**, for outer bearing retainer plate	1		4
718	PH-206	**COLLAR** for take-off shaft spacer	1		2
719	QD-543-A	**GASKET** for inner bearing retainer plate	1		1
720	QD-544	**GASKET** for outer bearing retainer plate	6		1
721	QD-545	**GASKET** for cover to housing	1		1
722	QD-546	**GASKET** around engine bearing plate	1		1
723	SD-79	**OIL INSTRUCTION TAG**	1		1
724	WA-55	**TAKE-OFF SHAFT**	1	6	14
		STANDARD HARDWARE			
726	PE-4	**LOCKWASHER**, 5/16" Positive For outer bearing retainer plate.	4		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

INTERCHANGEABLE PARTS FOR WW-27-C ETC. REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
727	PE-5	**LOCKWASHER,** 3/8" Positive For cover to housing mounting, above oil level.	6		1
728	PE-6	**LOCKWASHER,** 7/16" Positive For housing to crankcase mounting, inner holes.	2		1
729	PH-2	**PLAIN WASHER,** 7/16" I.D. x 1/16", thick steel For housing to crankcase mounting, outer holes.	2		1
730	PH-22	**PLAIN WASHER,** 3/8" I.D. x 1/16", thick steel For cover to housing mounting, below oil level.	5		1
731	PL-24	**KEY,** No. 29 Woodruff For driven gear mounting.	1		1
732	PL-88	**KEY,** ¼" square x 2" long For driver gear mounting.	1		1
733	XC-17	**SCREW,** 5/16"-18 thread x ¾" long, flat head For inner bearing retainer plate.	4		1
734	XD-15	**SCREW,** 5/16"-18 thread x ¾" long, hexagon head For outer bearing retainer plate.	4		1
735	XD-27	**SCREW,** 3/8"-16 thread x 1" long, hexagon head For cover to housing mounting.	11		1
736	XD-38	**SCREW,** 7/16"-14 thread x 2" long, hexagon head For housing to crankcase, inner holes.	2		2
737	XE-17	**SCREW,** ¼"-20 thread x 3/8" long, headless set For driver gear mounting.	1		1
738	XE-44	**SCREW,** 5/16"-18 thread x 5/8" long, headless set For driven gear mounting.	1		1
739	XK-2	**PLUG,** ¼"-pipe, square head For oil level.	3		1
740	XK-3	**PLUG,** 3/8" pipe, square head For oil level—when take-off shaft is in horizontal position.	2		2
741	XK-4	**PLUG,** ½" pipe, square head For oil drain.	1		2
742	XK-88	**REDUCER BUSHING,** 3/8" to 1/8" pipe For mounting breather.	1		1

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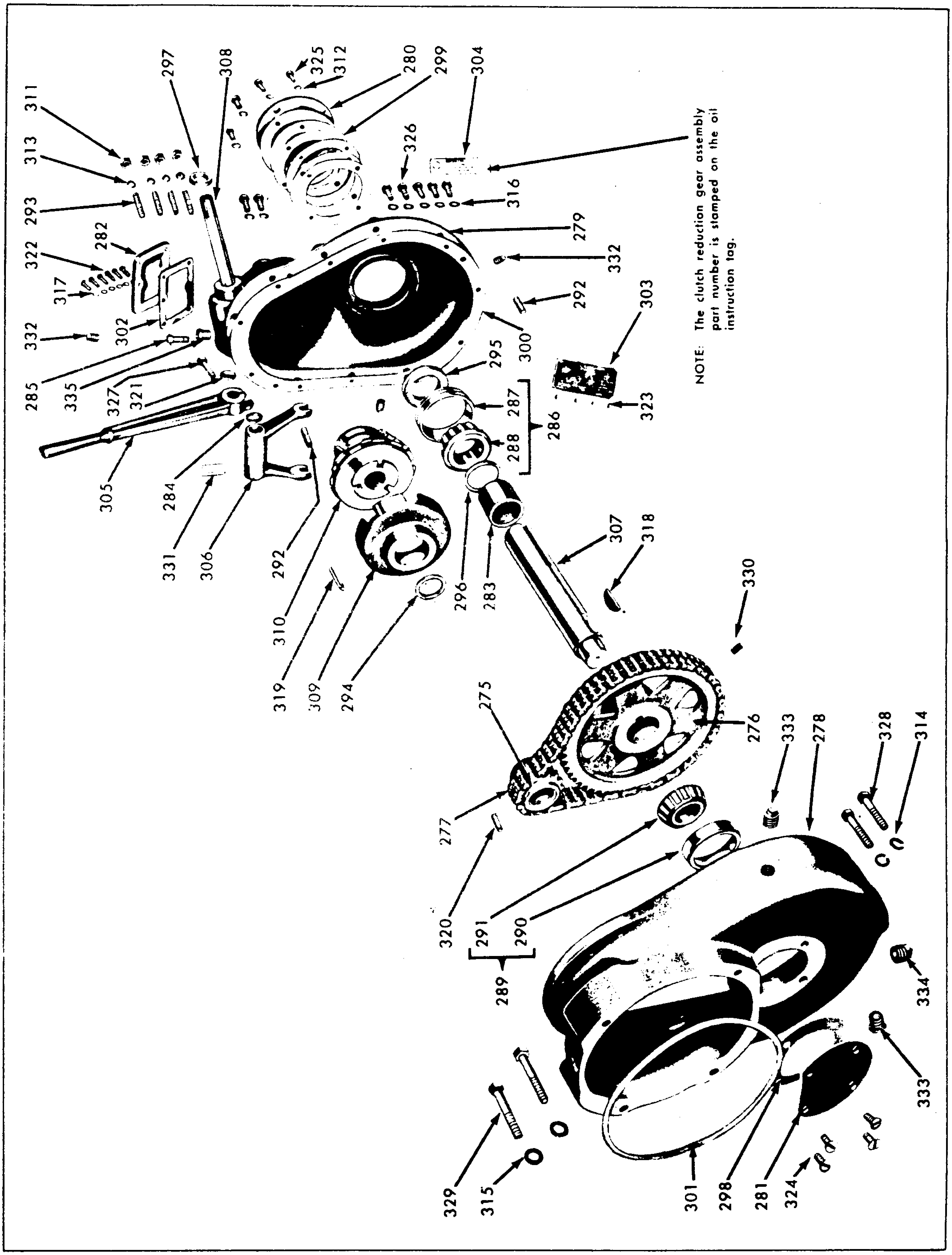
WW-24-D ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

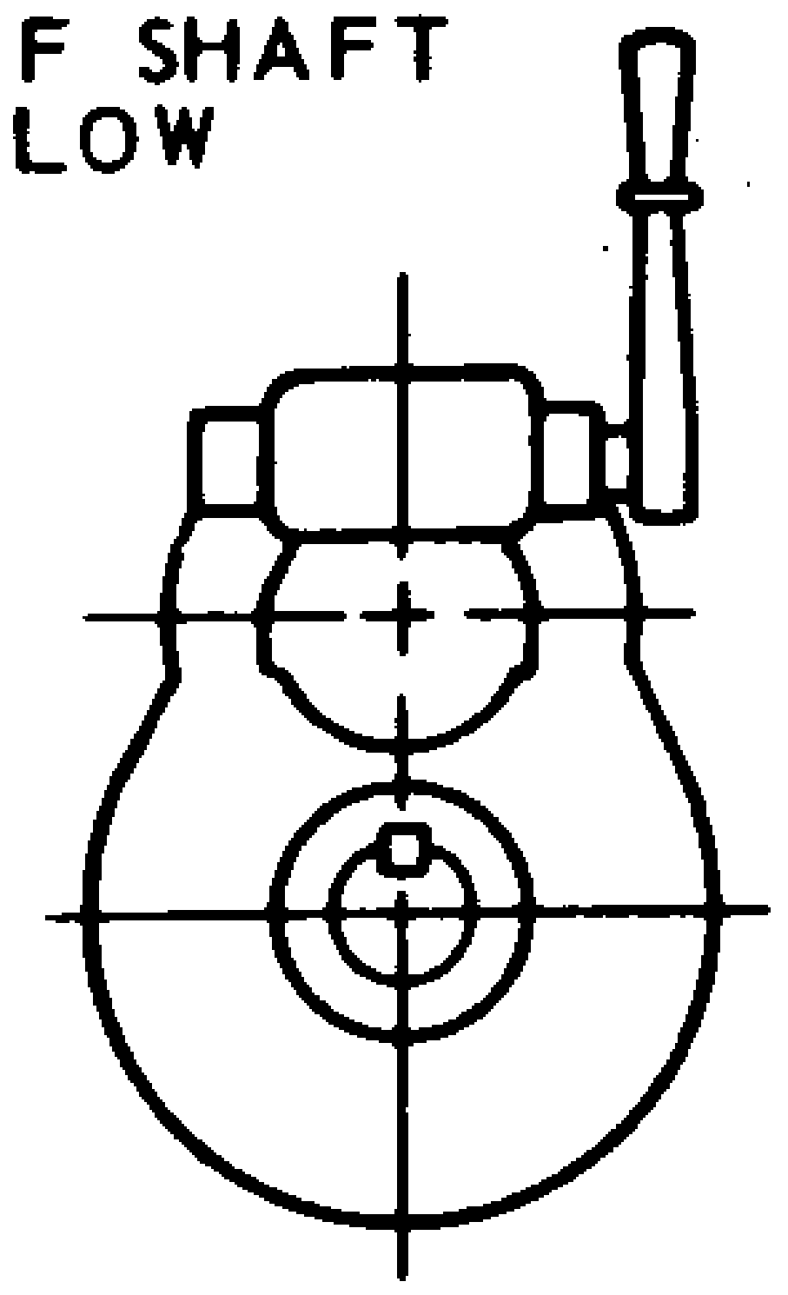
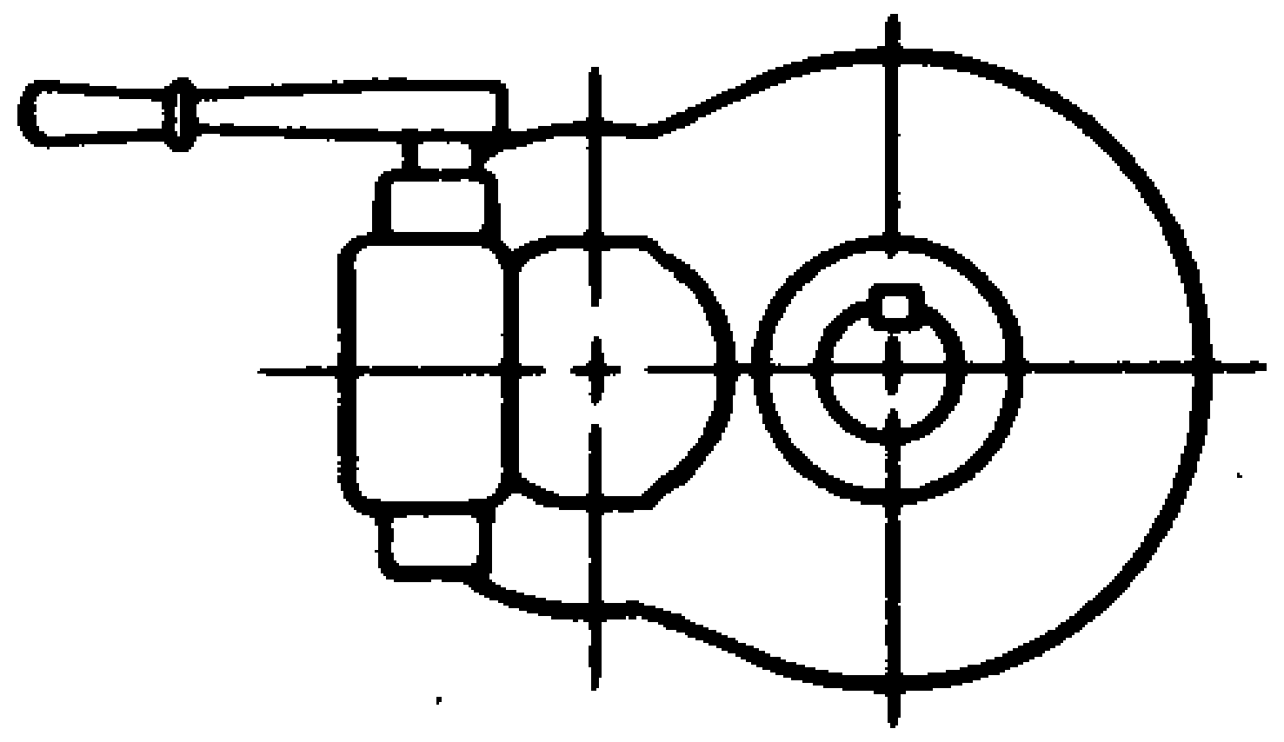
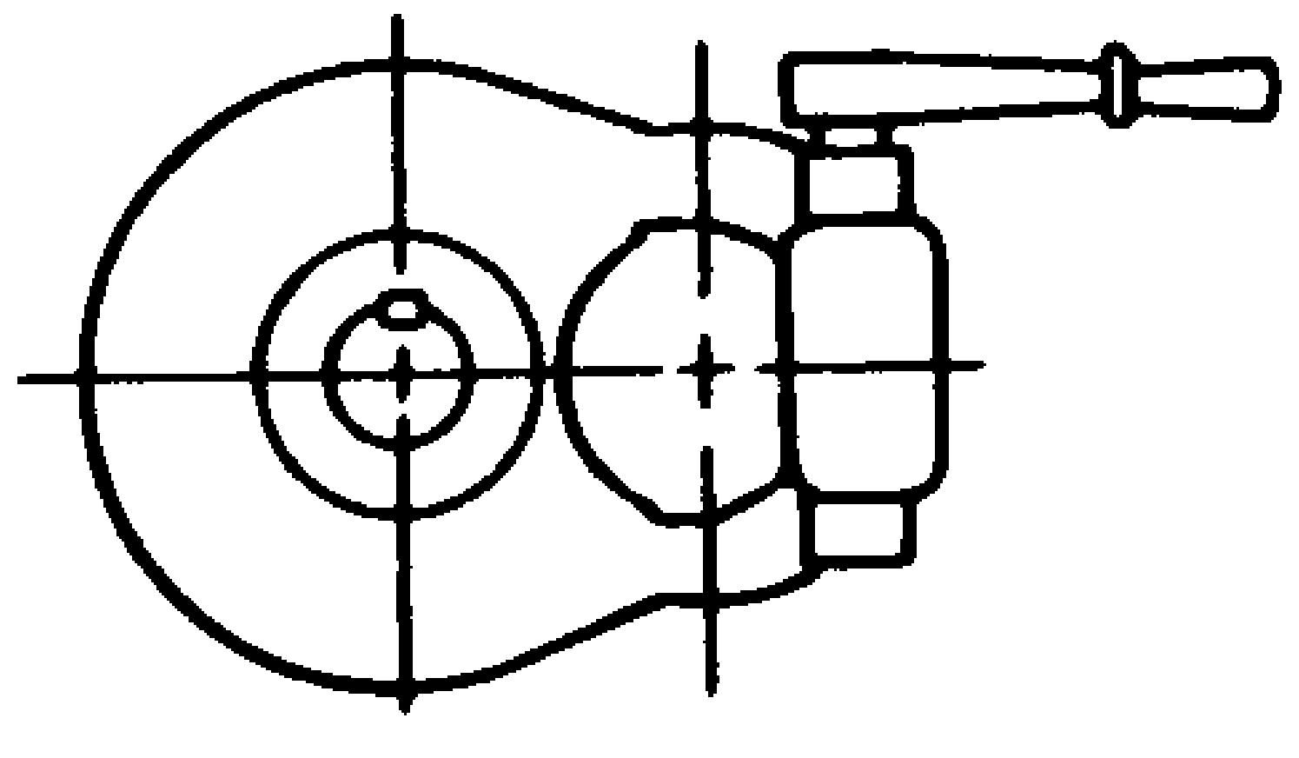
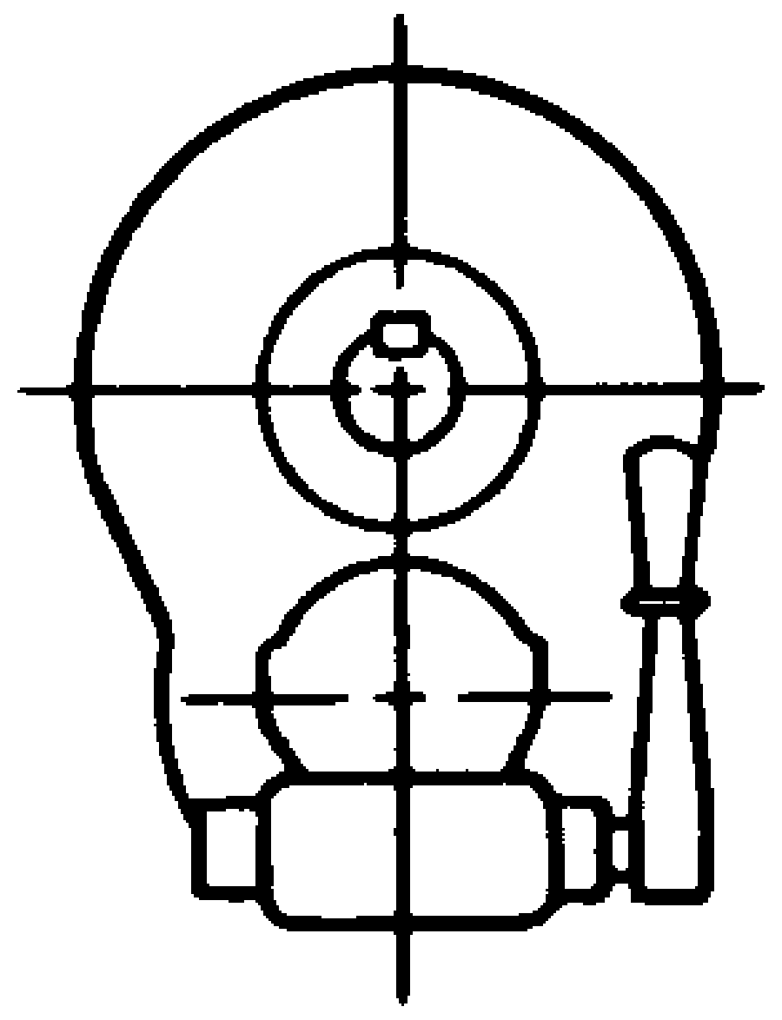


NOTE: The clutch reduction gear assembly part number is stamped on the oil instruction tag.

75277C

Parts are identified by reference number. See parts list for correct part number.

WW-24-D ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

Position of Take-off Shaft is determined when viewed from Cranking End of Engine (Views facing take-off end are shown)	Assembly Part Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 275	Ref. No. 276	Ref. No. 277	Ref. No. 278	Ref. No. 279
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.	Housing Cover Part No.
TAKE-OFF SHAFT BELOW 	WW-24-D	2.07 to 1	Counter Engine-Wise	GG-66-2	GG-67-1	....	BG-149-B	BH-113-B-2
	WW-24-D-1	3.00 to 1	Counter Engine-Wise	GG-76-1	GG-77-1	....	BG-149-B	BH-113-B-2
	WW-24-D-2	3.84 to 1	Counter Engine-Wise	GG-68-1	GG-69-1	....	BG-149-B	BH-113-B-2
	WW-24-D-3	2.00 to 1	Engine-Wise	GG-70	GG-71	GJ-8	BG-149-B	BH-113-B-2
	WW-24-D-4	2.67 to 1	Engine-Wise	GG-74	GG-71	GJ-9	BG-149-B	BH-113-B-2
	WW-24-D-5	3.79 to 1	Engine-Wise	GG-72	GG-73	GJ-10	BG-149-B	BH-113-B-2
 TAKE-OFF SHAFT ON LEFT HAND SIDE (as Viewed from the Cranking End)	WW-24-D-6	2.07 to 1	Counter Engine-Wise	GG-66-2	GG-67-1	....	BG-149-B-2	BH-113-B-2
	WW-24-D-7	3.00 to 1	Counter Engine-Wise	GG-76-1	GG-77-1	....	BG-149-B-2	BH-113-B-2
	WW-24-D-8	3.84 to 1	Counter Engine-Wise	GG-68-1	GG-69-1	....	BG-149-B-2	BH-113-B-2
	WW-24-D-9	2.00 to 1	Engine-Wise	GG-70	GG-71	GJ-8	BG-149-B-2	BH-113-B-2
	WW-24-D-10	2.67 to 1	Engine-Wise	GG-74	GG-71	GJ-9	BG-149-B-2	BH-113-B-2
	WW-24-D-11	3.79 to 1	Engine-Wise	GG-72	GG-73	GJ-10	BG-149-B-2	BH-113-B-2
 TAKE-OFF SHAFT ON RIGHT HAND SIDE (as Viewed from the Cranking End)	WW-24-D-12	2.07 to 1	Counter Engine-Wise	GG-66-2	GG-67-1	....	BG-149-B-1	BH-113-B-2
	WW-24-D-13	3.00 to 1	Counter Engine-Wise	GG-76-1	GG-77-1	....	BG-149-B-1	BH-113-B-2
	WW-24-D-14	3.84 to 1	Counter Engine-Wise	GG-68-1	GG-69-1	....	BG-149-B-1	BH-113-B-2
	WW-24-D-15	2.00 to 1	Engine-Wise	GG-70	GG-71	GJ-8	BG-149-B-1	BH-113-B-2
	WW-24-D-16	2.67 to 1	Engine-Wise	GG-74	GG-71	GJ-9	BG-149-B-1	BH-113-B-2
	WW-24-D-17	3.79 to 1	Engine-Wise	GG-72	GG-73	GJ-10	BG-149-B-1	BH-113-B-2
 TAKE-OFF SHAFT ON TOP	WW-24-D-18	2.07 to 1	Counter Engine-Wise	GG-66-2	GG-67-1	....	BG-149-B-3	BH-113-B-1
	WW-24-D-19	3.00 to 1	Counter Engine-Wise	GG-76-1	GG-77-1	....	BG-149-B-3	BH-113-B-1
	WW-24-D-20	3.84 to 1	Counter Engine-Wise	GG-68-1	GG-69-1	....	BG-149-B-3	BH-113-B-1
	WW-24-D-21	2.00 to 1	Engine-Wise	GG-70	GG-71	GJ-8	BG-149-B-3	BH-113-B-1
	WW-24-D-22	2.67 to 1	Engine-Wise	GG-74	GG-71	GJ-9	BG-149-B-3	BH-113-B-1
	WW-24-D-23	3.79 to 1	Engine-Wise	GG-72	GG-73	GJ-10	BG-149-B-3	BH-113-B-1

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WW-24-D ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

WEIGHTS OF PARTS SHOWN ON PRECEDING PAGE

Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.	
	Lb	Oz		Lb	Oz		Lb	Oz
BG-149-B	24		GG-76-1 (23 teeth)	2	8	WW-24-D-10	75	8
BG-149-B-1	24		GG-77-1 (69 teeth)	10	4	WW-24-D-11	78	
BG-149-B-2	24		GJ-8 (27" long)	1	13	WW-24-D-12	79	
BG-149-B-3	24		GJ-9 (26" long)	1	12	WW-24-D-13	80	
BH-113-B-1	19		GJ-10 (30" long)	2		WW-24-D-14	80	
BH-113-B-2	19		WW-24-D	79		WW-24-D-15	77	
GG-66-2 (30 teeth)	3	2	WW-24-D-1	80		WW-24-D-16	75	8
GG-67-1 (62 teeth)	8	11	WW-24-D-2	80		WW-24-D-17	78	
GG-68-1 (19 teeth)	1	10	WW-24-D-3	77		WW-24-D-18	79	
GG-69-1 (73 teeth)	10	15	WW-24-D-4	75	8	WW-24-D-19	80	
GG-70 (20 teeth)	2		WW-24-D-5	78		WW-24-D-20	80	
GG-71 (40 teeth)	5	4	WW-24-D-6	79		WW-24-D-21	77	
GG-72 (14 teeth)	1	2	WW-24-D-7	80		WW-24-D-22	75	8
GG-73 (53 teeth)	7	10	WW-24-D-8	80		WW-24-D-23	78	
GG-74 (15 teeth)	1	4	WW-24-D-9	77				

INTERCHANGEABLE PARTS OF WW-24-D ETC. CLUTCH REDUCTION GEAR ASSEMBLIES

NOTE: Engines equipped with a Clutch Reduction Gear Assembly require a special Main Bearing Plate, Crankshaft and Crankcase as follows:

BG-105-E-S2 **MAIN BEARING PLATE ASSEMBLY** (Not illustrated) Consisting of:
1 BG-105-E Bearing Plate 1 PH-364 Oil Seal 1 ME-66-1 Bearing Cup

CA-73-1-S1 **CRANKSHAFT ASSEMBLY** (Not illustrated) Consisting of:
1 CA-73-1 Crankshaft 1 GA-30-B Gear 2 ME-66 Bearings 1 PL-55 Key

THE DASH NUMBER OF THE CRANKCASE PART NUMBER CAN BE FOUND STAMPED ON THE FACE OF THE FUEL TANK MOUNTING PAD.

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
280	BG-150	**PLATE** for outer bearing retainer	1	1	
281	BG-151	**PLATE** for inner bearing retainer	1		6
282	BH-127-B	**COVER** for inspection hole BH-127, replaced by BH-127-B.	1		4
283	HF-265	**SPACER** for take-off shaft	1		3
284	HF-392	**SPACER** for yoke mounting (used when T.O. shaft is mounted to left or right side)	4		1
285	LO-44	**BREATHER**	1		1
286	ME-76	**OUTER BEARING ASSEMBLY** Consisting of:	1	1	11
287		**ME-76-1** Bearing cup (Timken 3525)	1		10
288		**ME-76-2** Bearing cone (Timken 3578)	1	1	1
289	ME-77	**INNER BEARING ASSEMBLY** Consisting of:	1		15
290		**ME-77-1** Bearing cup (Timken 02820)	1		6
291		**ME-77-2** Bearing cone (Timken 02877)	1		9
292	PA-279	**DOWEL PIN** for cover	2		1

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
293	PC-133	**STUDS** for cover to housing upper holes	4		2
294	PH-201	**WASHER** for pinion gear thrust	1		2
295	PH-202	**OIL SEAL** for bearing retainer plate	1		4
296	PH-206	**COLLAR** for take-off shaft spacer	1		2
297	PH-234-A	**OIL SEAL** for shifter lever shaft	1		2
298	QD-543-A	**GASKET** for inner bearing retainer plate	1		1
299	QD-544	**GASKET** for outer bearing retainer plate	6		1
300	QD-545	**GASKET** for cover to housing	1		1
301	QD-546	**CORK STRIP** around bearing plate	1		1
302	QD-592	**GASKET** for inspection hole cover	1		1
303	SD-59	**INSTRUCTION PLATE** For clutch adjusting.	1		1
304	SD-79	**TAG** for oil instruction	1		1

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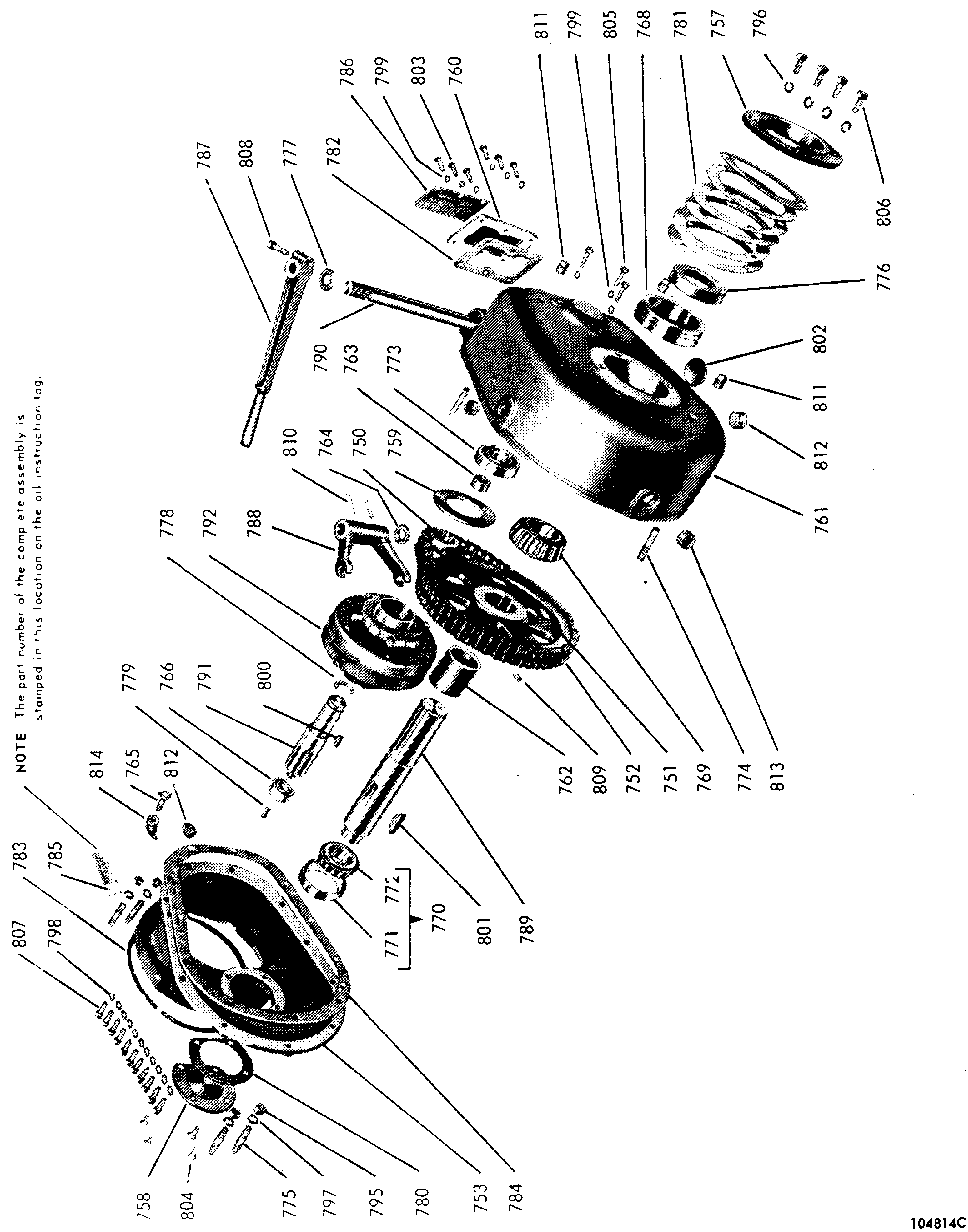
INTERCHANGEABLE PARTS OF WW-24-D ETC. CLUTCH REDUCTION GEAR ASSEMBLIES FOR AGND ENGINE

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
305	VB-55-1	**SHIFTER LEVER**	1	2	
306	VB-64-A	**SHIFTER YOKE**	1	1	4
307	WA-55	**TAKE-OFF SHAFT**	1	6	14
308	WA-61	**SHIFTER SHAFT**	1	1	
309	WC-216-A	**HUB** for clutch drive	1	2	9
310	WC-220-2	**CLUTCH**, Twin Disc 4½" Model 'V' 4937 **NOTE:** See Twin Disc illustration and parts list for clutch parts.	1	6	15
		STANDARD HARDWARE			
311	PD-11	**NUT**, 3/8"-24 thread, hexagon steel For cover to housing studs.	4		1
312	PE-4	**LOCKWASHER**, 5/16" Positive For outer bearing retainer plate.	4		1
313	PE-5	**LOCKWASHER**, 3/8" Positive For cover to housing, above oil level.	6		1
314	PE-6	**LOCKWASHER**, 7/16" Positive For housing to crankcase, inner holes.	2		1
315	PH-2	**WASHER**, 7/16" I.D. x 13/16" O.D. x 1/16 thick, plain steel For housing to crankcase, outer holes.	2		1
316	PH-26	**WASHER**, 3/8" I.D. x 11/16" O.D. x 1/16" thick, plain copper For cover to housing, below oil level.	5		1
317	PH-30	**WASHER**, ¼" I.D. x 7/16" O.D. x 1/16" thick, plain copper For inspection hole cover.	6		1
318	PL-24	**KEY**, No. 29 Woodruff For driven gear.	1		1
319	PL-91	**KEY**, ¼" square x 2-7/8" long For clutch mounting.	1		1
320	PL-95-1	**KEY**, 3/16" square x 1" long For clutch housing to drive gear.	1		1
321	SA-58	**PLUG**, 1-3/8" Expansion For clutch shifter shaft hole.	1		1
322	XA-34	**SCREW**, ¼"-20 thread x ½" long, round head For sheet steel inspection cover. XA-36, ¾" long, for cast iron cover.	6		1
323	XA-100	**SCREW**, No. 4 x ¼" round head metallic drive For clutch adjustment plate. XA-68, No. 2 x ¼" Screw, replaced by XA-100.	4		1
324	XC-17	**SCREW**, 5/16"-18 thread x ¾" long, flat head For inner bearing retainer plate.	4		1
325	XD-15	**SCREW**, 5/16"-18 thread x ¾" long, hexagon head For outer bearing retainer plate.	4		1
326	XD-29	**SCREW**, 3/8"-16 thread x 1¼" long, hexagon head For cover to housing.	7		1
327	XD-30	**SCREW**, 3/8"-16 thread x 1½" long, hexagon head For clamping shifter lever.	1		1
328	XD-38	**SCREW**, 7/16"-14 thread x 2" long, hexagon head For housing to crankcase, inner holes.	2		2
329	XD-39	**SCREW**, 7/16"-14 thread x 2½" long, hexagon head For housing to crankcase, outer holes.	2		2
330	XE-44	**SET SCREW**, 5/16"-18 thread x 5/8" long, headless For driven gear mounting.	1		1
331	PA-341	**ROLL PIN**, 1/4" dia. x 1-1/8" long For shifter yoke to shaft. XH-26, No. 4 x 1-3/8" long, taper pin, replaced by PA-341.	2		1
332	XK-2	**PLUG**, ¼" square head pipe For oil level holes.	4		1
333	XK-3	**PLUG**, 3/8" square head pipe For oil level and drain, when take-off shaft is mounted to R.H. or L.H. side.	4		1
334	XK-4	**PLUG**, ½" square head pipe For oil drain hole.	1		2
335	XK-88	**BUSHING**, 3/8" to 1/8" pipe reducer For mounting breather.	1		1
		XK-21, ¼" to 1/8" reducer bushing For mounting breather, when take-off shaft is mounted to R.H. or L.H. side.	1		1

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW 170- etc. CLUTCH REDUCTION GEAR ASSEMBLIES
For Model **AGND** Engine

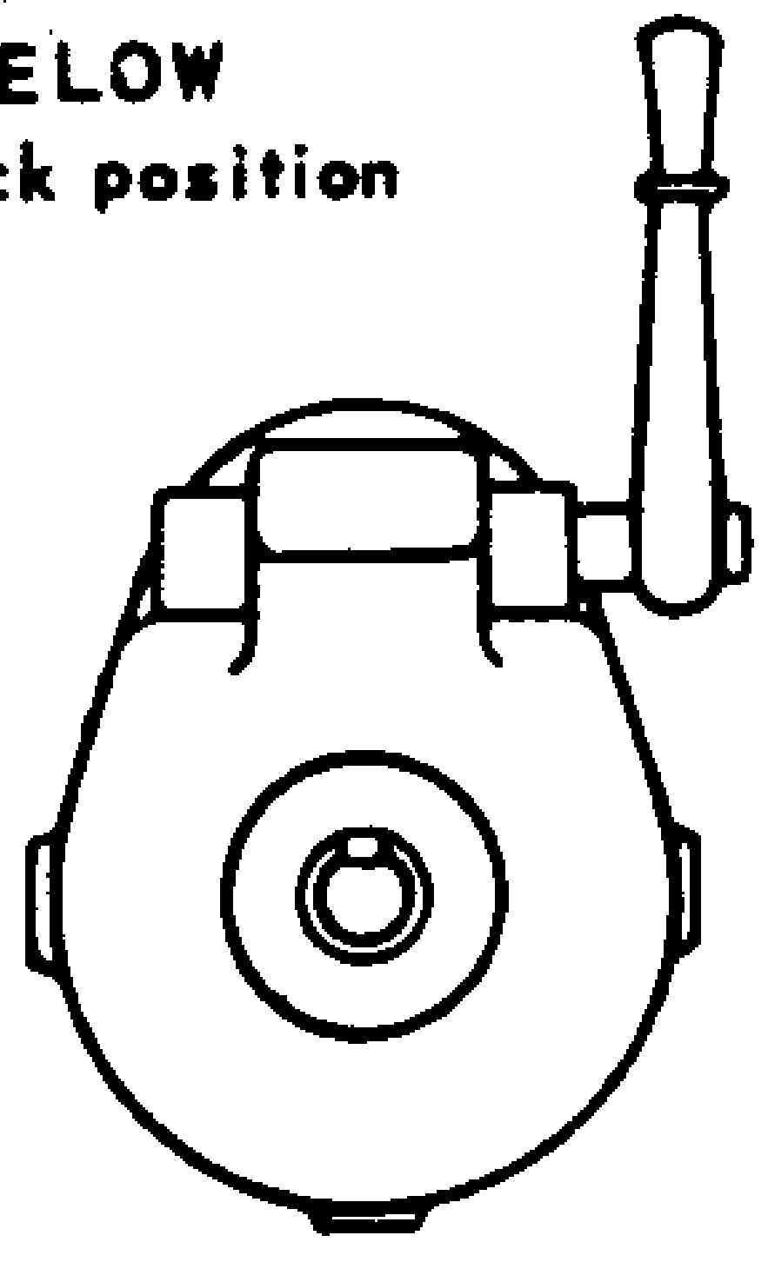
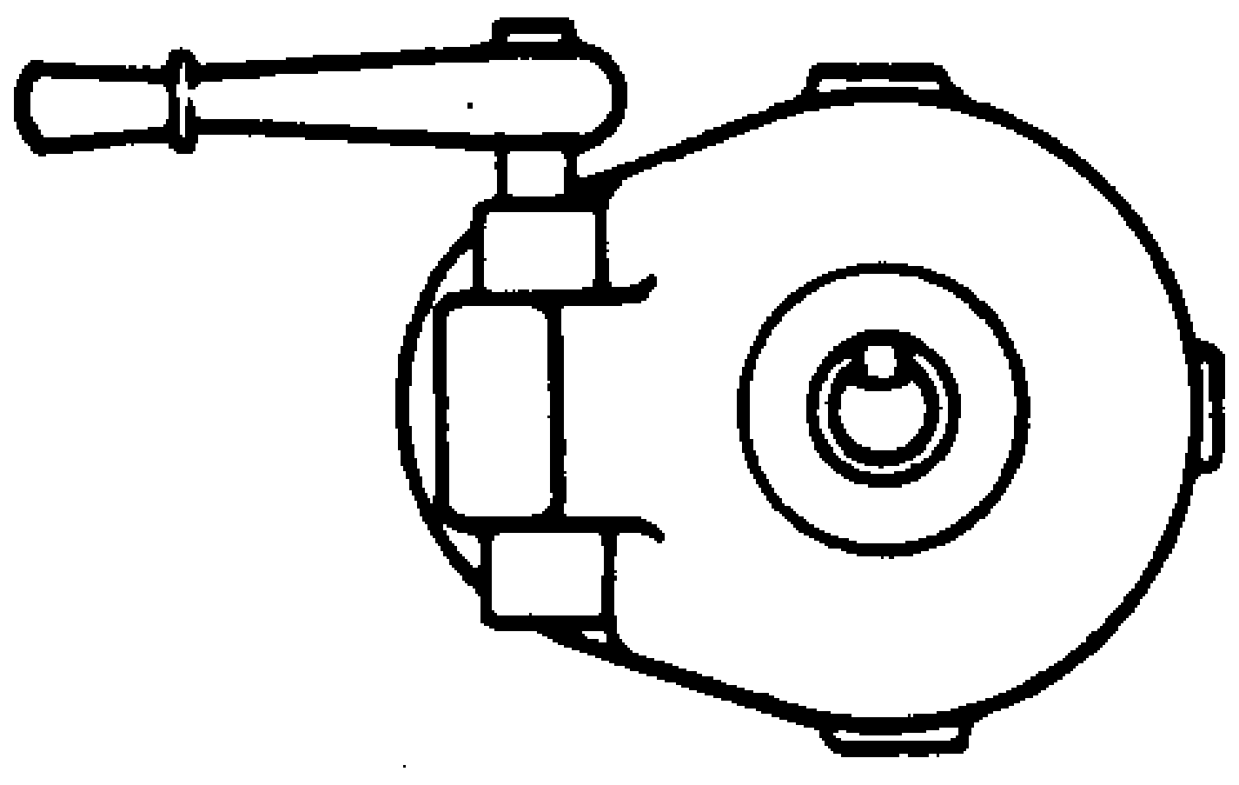
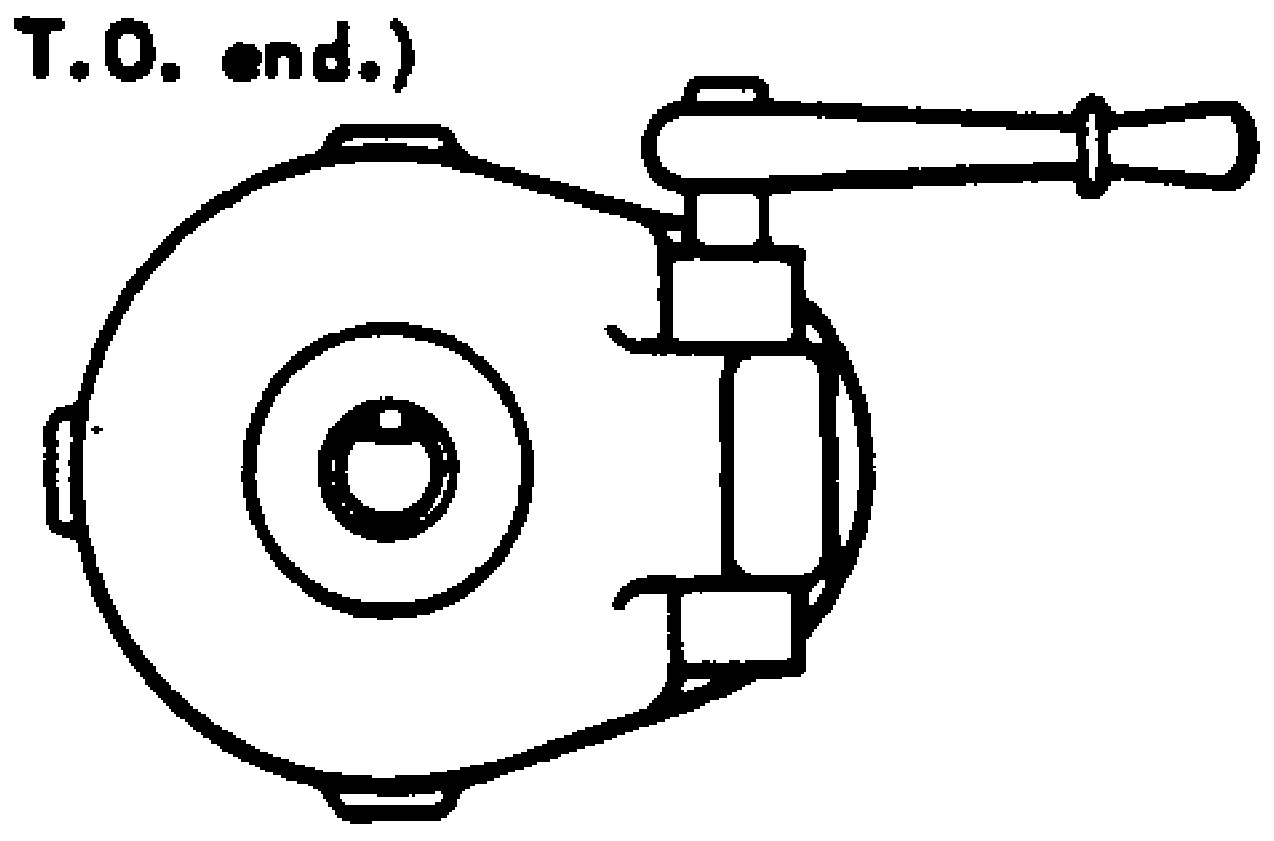
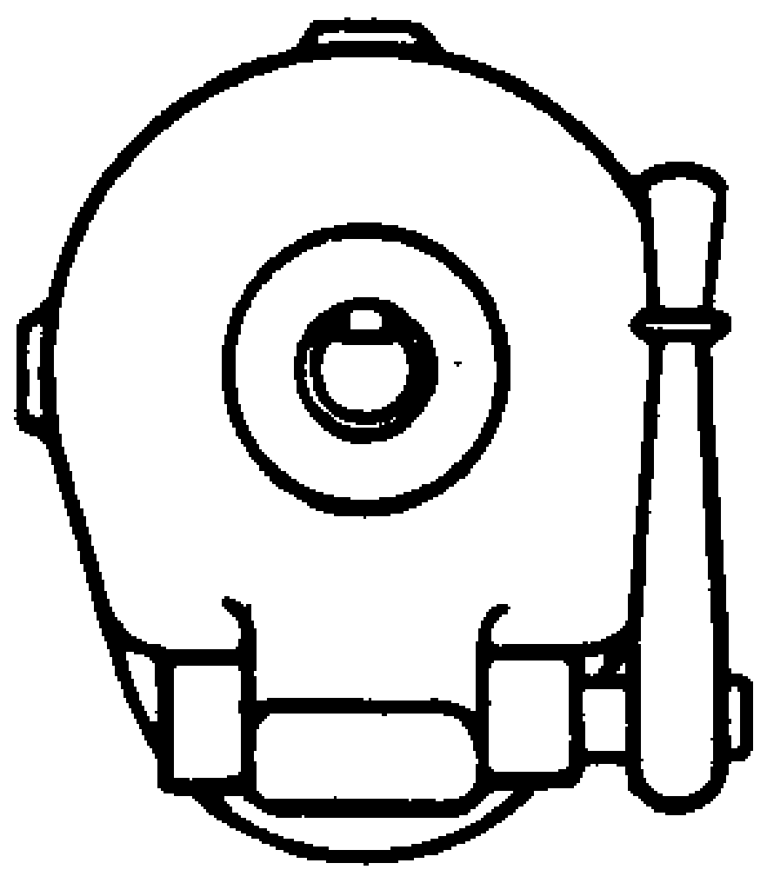


NOTE The part number of the complete assembly is stamped in this location on the oil instruction tag.

104814C

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

WW 170- etc. CLUTCH REDUCTION GEAR ASSEMBLIES
For Model **AGND** Engine

Determine position of take-off shaft when viewing from cranking end of engine. (Views facing take-off end are shown.)	Assembly Number	Reduction Ratio	Rotation of Take-off Shaft	Ref. No. 750	Ref. No. 751	Ref. No. 752	Ref. No. 753
				Driver Gear Part No.	Driven Gear Part No.	Chain Part No.	Housing Part No.
TAKE-OFF SHAFT BELOW 6 o'clock position 	WW 170	2.07 to 1	Ctr. Engine-Wise	GG 116	GG 67-1	....	BG 215 B 5
	WW 170-1	3.00 to 1	Ctr. Engine-Wise	GG 117	GG 77-1	....	BG 215 B 5
	WW 170-2	3.84 to 1	Ctr. Engine-Wise	GG 118	GG 69-1	....	BG 215 B 5
	WW 170-3	2.00 to 1	Engine-Wise	GG 113	GG 71	GJ 8	BG 215 B 5
	WW 170-4	2.67 to 1	Engine-Wise	GG 114	GG 71	GJ 9	BG 215 B 5
	WW 170-5	3.79 to 1	Engine-Wise	GG 115	GG 73	GJ 10	BG 215 B 5
TAKE-OFF SHAFT ON LEFT SIDE as viewed from the cranking end. (3 o'clock position - viewing T.O. end.) 	WW 170-6	2.07 to 1	Ctr. Engine-Wise	GG 116	GG 67-1	....	BG 215 B 4
	WW 170-7	3.00 to 1	Ctr. Engine-Wise	GG 117	GG 77-1	....	BG 215 B 4
	WW 170-8	3.84 to 1	Ctr. Engine-Wise	GG 118	GG 69-1	....	BG 215 B 4
	WW 170-9	2.00 to 1	Engine-Wise	GG 113	GG 71	GJ 8	BG 215 B 4
	WW 170-10	2.67 to 1	Engine-Wise	GG 114	GG 71	GJ 9	BG 215 B 4
	WW 170-11	3.79 to 1	Engine-Wise	GG 115	GG 73	GJ 10	BG 215 B 4
TAKE-OFF SHAFT ON RIGHT SIDE as viewed from the cranking end. (9 o'clock position - viewing T.O. end.) 	WW 170-12	2.07 to 1	Ctr. Engine-Wise	GG 116	GG 67-1	....	BG 215 B 6
	WW 170-13	3.00 to 1	Ctr. Engine-Wise	GG 117	GG 77-1	....	BG 215 B 6
	WW 170-14	3.84 to 1	Ctr. Engine-Wise	GG 118	GG 69-1	....	BG 215 B 6
	WW 170-15	2.00 to 1	Engine-Wise	GG 113	GG 71	GJ 8	BG 215 B 6
	WW 170-16	2.67 to 1	Engine-Wise	GG 114	GG 71	GJ 9	BG 215 B 6
	WW 170-17	3.79 to 1	Engine-Wise	GG 115	GG 73	GJ 10	BG 215 B 6
TAKE-OFF SHAFT ON TOP 12 o'clock position 	WW 170-18	2.07 to 1	Ctr. Engine-Wise	GG 116	GG 67-1	....	BG 215 B 7
	WW 170-19	3.00 to 1	Ctr. Engine-Wise	GG 117	GG 77-1	....	BG 215 B 7
	WW 170-20	3.84 to 1	Ctr. Engine-Wise	GG 118	GG 69-1	....	BG 215 B 7
	WW 170-21	2.00 to 1	Engine-Wise	GG 113	GG 71	GJ 8	BG 215 B 7
	WW 170-22	2.67 to 1	Engine-Wise	GG 114	GG 71	GJ 9	BG 215 B 7
	WW 170-23	3.79 to 1	Engine-Wise	GG 115	GG 73	GJ 10	BG 215 B 7

WEIGHTS of PARTS LISTED ABOVE

WW 170 etc. complete units weigh approximately 90 lbs.

Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.		Part Number	Net Wt.	
	lb	oz		lb	oz		lb	oz		lb	oz
BG 215 B etc.	20		**GG 73** (53 teeth)	7	10	**GG 115** (14 teeth)		14	**GJ 8** (54 links)	1	13
GG 67-1 (62 teeth)	8	11	**GG 77-1** (69 teeth)	10	4	**GG 116** (30 teeth)	2	10	**GJ 9** (52 links)	1	12
GG 69-1 (73 teeth)	10	15	**GG 113** (20 teeth)	1	14	**GG 117** (23 teeth)	2	1	**GJ 10** (60 links)	2	
GG 71 (40 teeth)	5	4	**GG 114** (15 teeth)		14	**GG 118** (19 teeth)	1	12			

INTERCHANGEABLE PARTS for WW170- etc. CLUTCH REDUCTION GEAR ASSEMBLIES For Model AGND

NOTE: Engines equipped with a Clutch Reduction Gear Assembly require a special Bearing Plate and Crankshaft as follows:

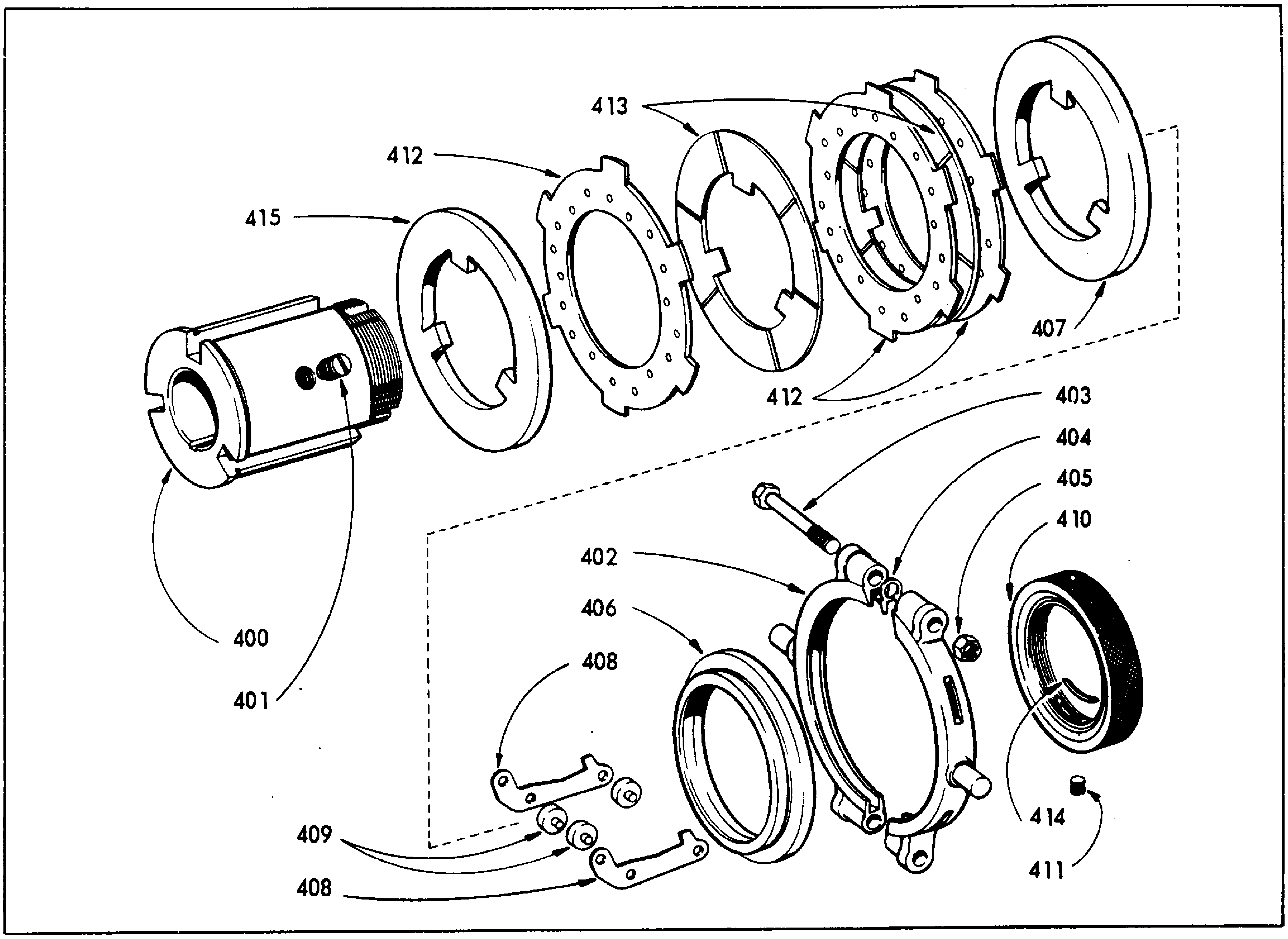
BG 105 E 3 S 2 **MAIN BEARING PLATE ASSEMBLY** (Not illustrated) consisting of:
1 BG 105 E 3 Plate 1 PH 364 Oil Seal 1 ME 66-1 Bearing Cup

CA 73-49 S 1 **CRANKSHAFT ASSEMBLY** (Not illustrated) consisting of:
1 CA 73-49 Crankshaft 1 GA 36 A Gear 2 ME 66 Bearings 1 PL 53 Key

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
757	BG 150	**PLATE** for retaining bearing (outer)	1	1	
758	BG 151	**PLATE** for retaining bearing (inner)	1		6
759	BG 216	**PLATE** for clutch bearing	1		8
760	BH 127 B	**COVER** for inspection opening	1		8
761	BH 143 B	**COVER** for reduction gear housing	1	20	
762	HF 265 A	**SPACER** for take-off shaft	1		6
763	HF 372 A	**SPACER** for ball bearing	1		3
764	HF 392 A	**SPACER** for shifter yoke, 3/16" thick .. (Used only when take-off shaft is on the right or left hand side).	1		2
765	LO 44	**BREATHER**	1		1
766	ME 189	**PILOT BEARING** (Furnished as part of WC 288 A Clutch Assembly)	1		8
767	ME 76	**BEARING ASSEMBLY** (outer) .... Consisting of:	1	1	11
768		ME 76-1 Cup *			
769		ME 76-2 Cone * * Not sold separately.			
770	ME 77	**BEARING ASSEMBLY** (inner) .... Consisting of:	1		15
771		ME 77-1 Cup *			
772		ME 77-2 Cone * * Not sold separately.			
773	ME 119	**BALL BEARING** for clutch shaft	1		6
774	PA 279	**DOWEL PIN** for cover to housing	2		1
775	PC 392	**STUD** for housing to crankcase	4		2
776	PH 202	**OIL SEAL** for take-off shaft	1		4
777	PH 234 A	**OIL SEAL** for shifter lever shaft	1		3
778	PK 82	**RETAINING RING** .... For clutch shaft bearing.	1		1
779	PL 140	**SQUARE KEY,** 5/16" x 1-1/8" long ...... For clutch drive hub.	1		1
780	QD 543 A	**GASKET** for bearing retainer plate (inner)	1		1
781	QD 544	**GASKET** for bearing retainer plate (outer) * 8 to 12 gaskets required to maintain .001 to .003 inch end play.	*		1
782	QD 592	**GASKET** for inspection hole cover	1		1
783	QD 546	**CORK SEAL** around eng. bearing plate	1		1
784	QD 856	**GASKET** for cover to housing	1		1
785	SD 79	**OIL INSTRUCTION TAG**	1		1
786	SD 125 A	**INSTRUCTION PLATE,** for clutch adj.	1		1
787	VB 55-1	**SHIFTER LEVER**	1	2	
788	VB 64 A	**SHIFTER YOKE**	1	1	8
789	WA 55 H	**TAKE-OFF SHAFT**	1	6	10
790	WA 61D	**SHIFTER SHAFT**	1	1	12
791	WA 87 A	**DRIVE SHAFT**	1	2	8
792	WC 288 A	**CLUTCH ASSEMBLY** .... Rockford CLA 1462 AF.	1	12	
	NOTE: See illustration and parts list of clutch on **Page 36B.**				

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
		STANDARD HARDWARE			
795	PD 12	**NUT,** 7/16"-20 thread, hexagon steel .... For housing to crankcase studs.	4		1
796	PE 4	**LOCKWASHER,** 5/16" spring lock .... For outer bearing retainer plate.	4		1
797	PE 6	**LOCKWASHER,** 7/16" spring lock .... For housing to crankcase mounting.	4		1
798	PE 5	**LOCKWASHER,** 3/8" spring lock .... For cover to housing mounting.	11		1
799	PH 30	**PLAIN WASHER,** 1/4" I.D. x 1/16" thick copper .... 6-for inspection hole cover. 3-for bearing retainer plate.	9		1
800	PL 17	**KEY,** No. 13 Woodruff, for drive gear	1		1
801	PL 24	**KEY,** No. 29 Woodruff, for driven gear ..	1		1
802	SA 58	**PLUG,** 1-3/8" expansion .... For shifter shaft hole.	1		1
803	XA 34	**SCREW,** 1/4"-20 thread x 1/2" long, round or indented hexagon head .... For inspection hole cover.	6		1
804	XC 68	**SCREW,** 5/16"-18 thread x 3/4" long, socket flat head .... For inner bearing retainer plate.	4		1
805	XD 7	**SCREW,** 1/4"-20 thread x 1" long, hexagon head .... For clutch bearing retainer plate.	3		1
806	XD 15	**SCREW,** 5/16"-18 thread x 3/4" long, hexagon head .... For outer bearing retainer plate.	4		1
807	XD 28	**SCREW,** 3/8"-16 thread x 1-1/8" long, hexagon head .... For cover to housing mounting.	11		1
808	XD 30	**SCREW,** 3/8"-16 thread x 1½" long, hexagon head, for shifter lever clamp	1		2
809	XE 44	**SCREW,** 5/16"-18 thread x 5/8" long, headless set, for driven gear	1		1
810	PA 341	**ROLL PIN,** 1/4" dia. x 1-1/8" long ...... For shifter yoke to shaft.	2		1
811	XK 2	**PLUG,** 1/4" pipe, square head .... For oil level.	2		1
812	XK 4	**PLUG,** 1/2" pipe, square head .... For oil filler drain and adjustment holes.	6		2
813	XK 6	**PLUG,** 1/2" pipe, countersunk head ...... For oil drain (6 o'clock position only).	1		2
814	XK 77 A	**STREET ELL,** 1/8" pipe x 45°, brass .. For breather mounting.	1		1

TWIN DISC 4½", No. X4937 CLUTCH ASSEMBLY
WISCONSIN MOTOR PART NUMBER WC-220-2



REPAIR PARTS LIST FOR X4937, MODEL V3045 CLUTCH
SPECIFICATION 29204 (REPLACES 13853 DUE TO HUB CHANGE–INTERCHANGEABLE)

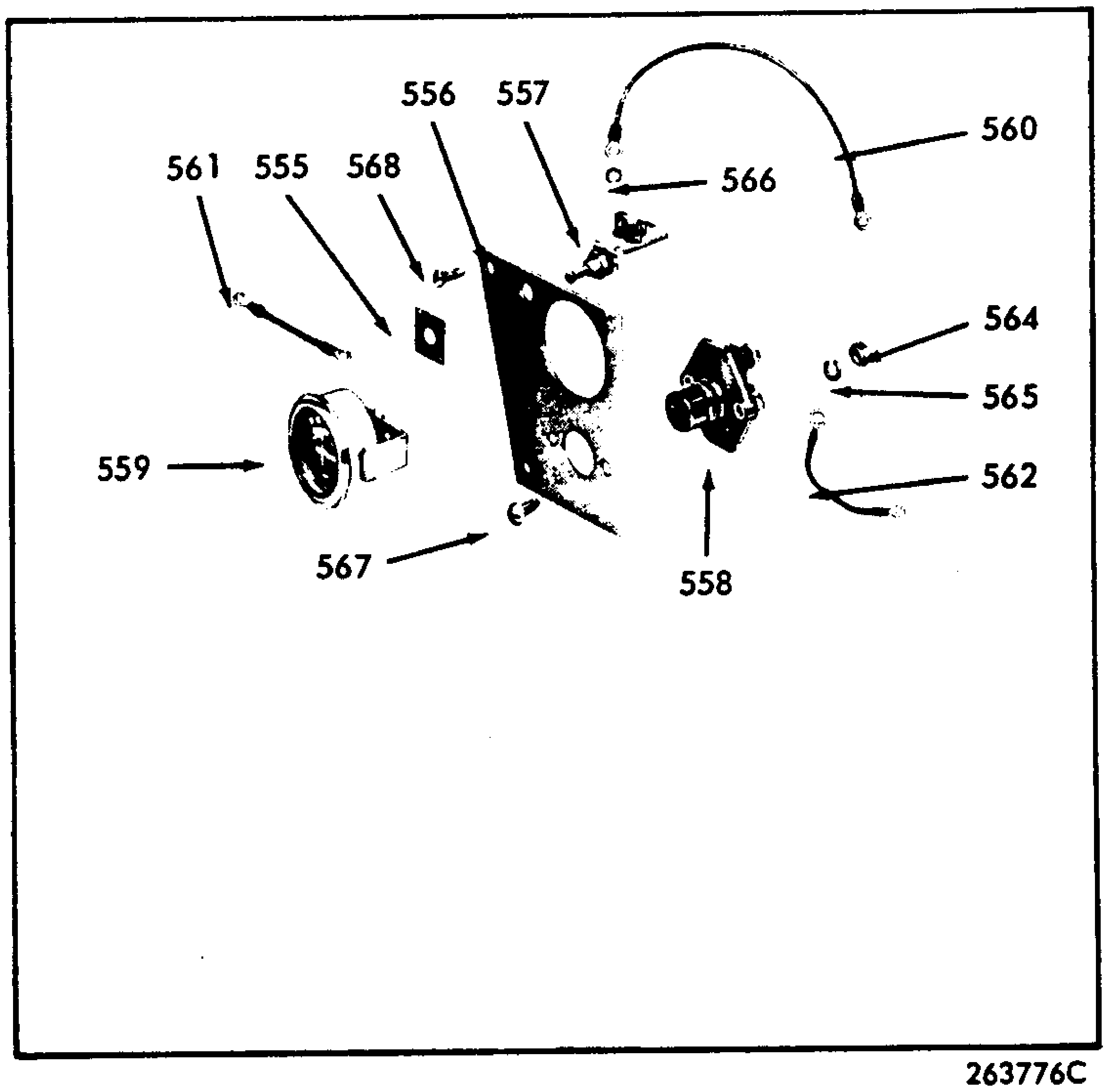
NOTE: Code number 78, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
400	78-Z4956G	**HUB**, 1.1875"-1.1865" bore, ¼" x 1/8" keyway 4956D, replaced by 78-Z4956G.	1
401	78-M2042K	**SET SCREW** for hub, 3/8"-16 thread x 5/8" long, cut point	1
402	78-X4941A	**SLEEVE COLLAR ASSEMBLY** Includes:	1
403		78-M2000T Cap screw, 1/4"-28 thread x 2" long, hexagon head	2
404		78-2710 Shim	2
405		78-M1930A Locknut, 1/4"-28 thread x 7/32"	2
406	78-A1495	**WEDGE SLEEVE**	1
407	78-A1493	**CLAMPING PLATE**	1
408	78-4957	**LEVER**	6
409	78-A1494	**LEVER ROLLER**	9
410	78-A1496A	**LOCK** and **ADJUSTING NUT**	1
411	78-M2041AQ	**SET SCREW** for adjusting nut	1
412	78-4958	**DRIVE PLATE**	3
413	78-4955	**DRIVEN PLATE**	2
414	78-A2260	**LOCKWIRE**	1
415	78-A1493C	**BACK CLAMPING PLATE**	1

When ordering parts, kindly advise clutch specification number.

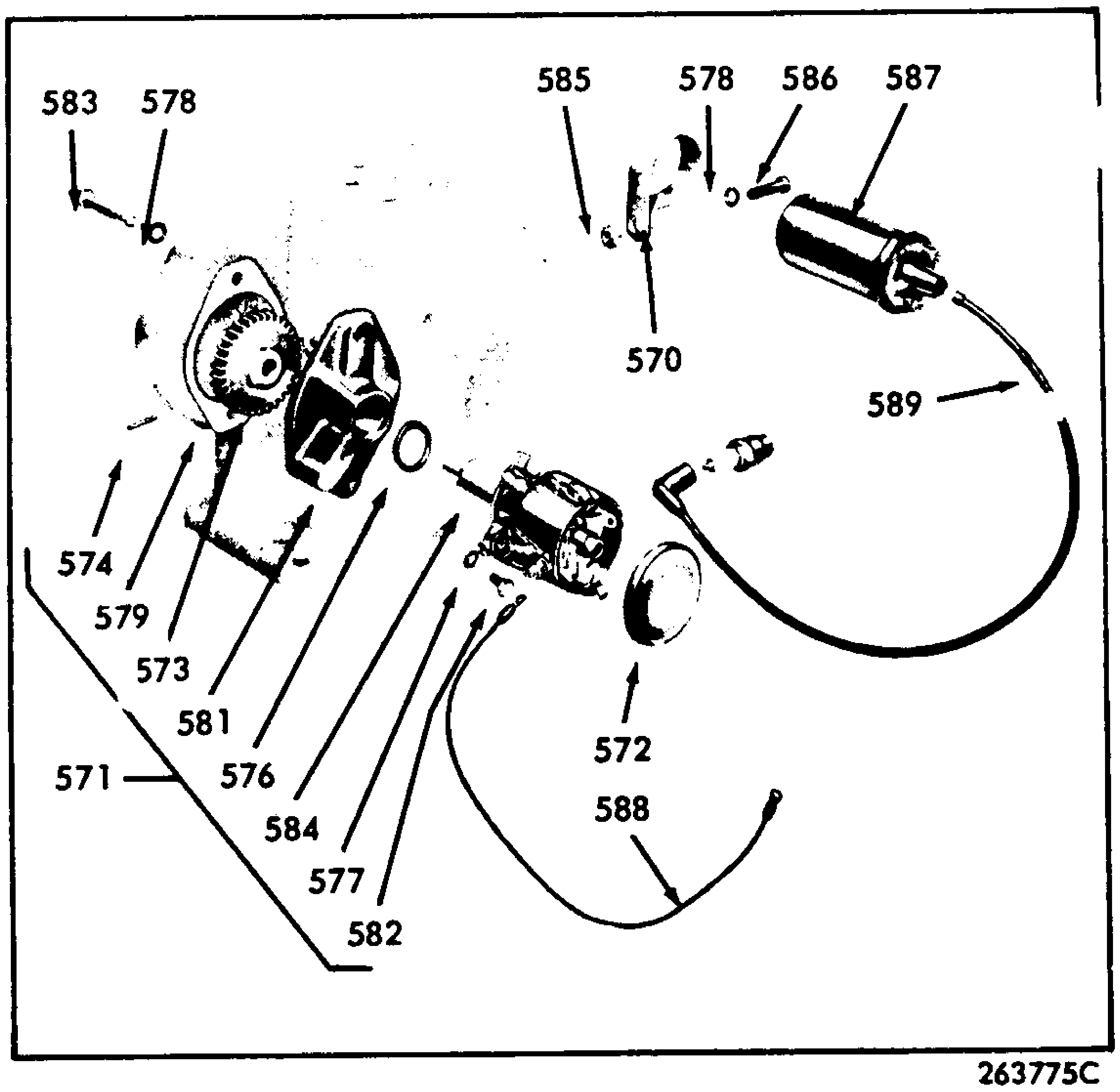
ELECTRICAL EQUIPMENT FOR MODEL AGND ENGINE

CONTROL PANEL



263776C

IGNITION TIMER



263775C

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
555	SD-109	**TAG** for ignition switch	1		1
556	VE-262-2	**CONTROL PANEL**	1		4
557	YC-9-B-S1	**IGNITION SWITCH** with SD-109 Tag and PE-72 Lockwashers	1		2
558	YC-10-C	**STARTING SWITCH** YC-10, replaced by YC-10-C.	1		4
559	YE-2	**AMMETER**	1		6
560	YL-111	**IGNITION WIRE ASSEMBLY**, ignition switch to coil, 9½" long, with terminals.	1		1
561	YL-179	**IGNITION WIRE ASSEMBLY**, ammeter to ignition switch, 3½" long, with terminals	1		1
562	YL-184	**IGNITION WIRE ASSEMBLY**, starter switch to ammeter, 4" long, with terminals	1		1
		STANDARD HARDWARE			
564	PD-77	**NUT**, 1/4"-20 thread, hexagon steel For starting switch.	2		1
565	PE-3	**LOCKWASHER**, 1/4" Positive For starting switch.	2		1
566	PE-72	**LOCKWASHER** for ignition switch terminal	2		1
567	XA-36	**SCREW**, 1/4"-20 thread x 3/4" long, round head For starting switch.	2		1
568	XA-79	**SCREW**, No. 14 x 1/2" long, self tapping, round head For mounting control panel.	2		1

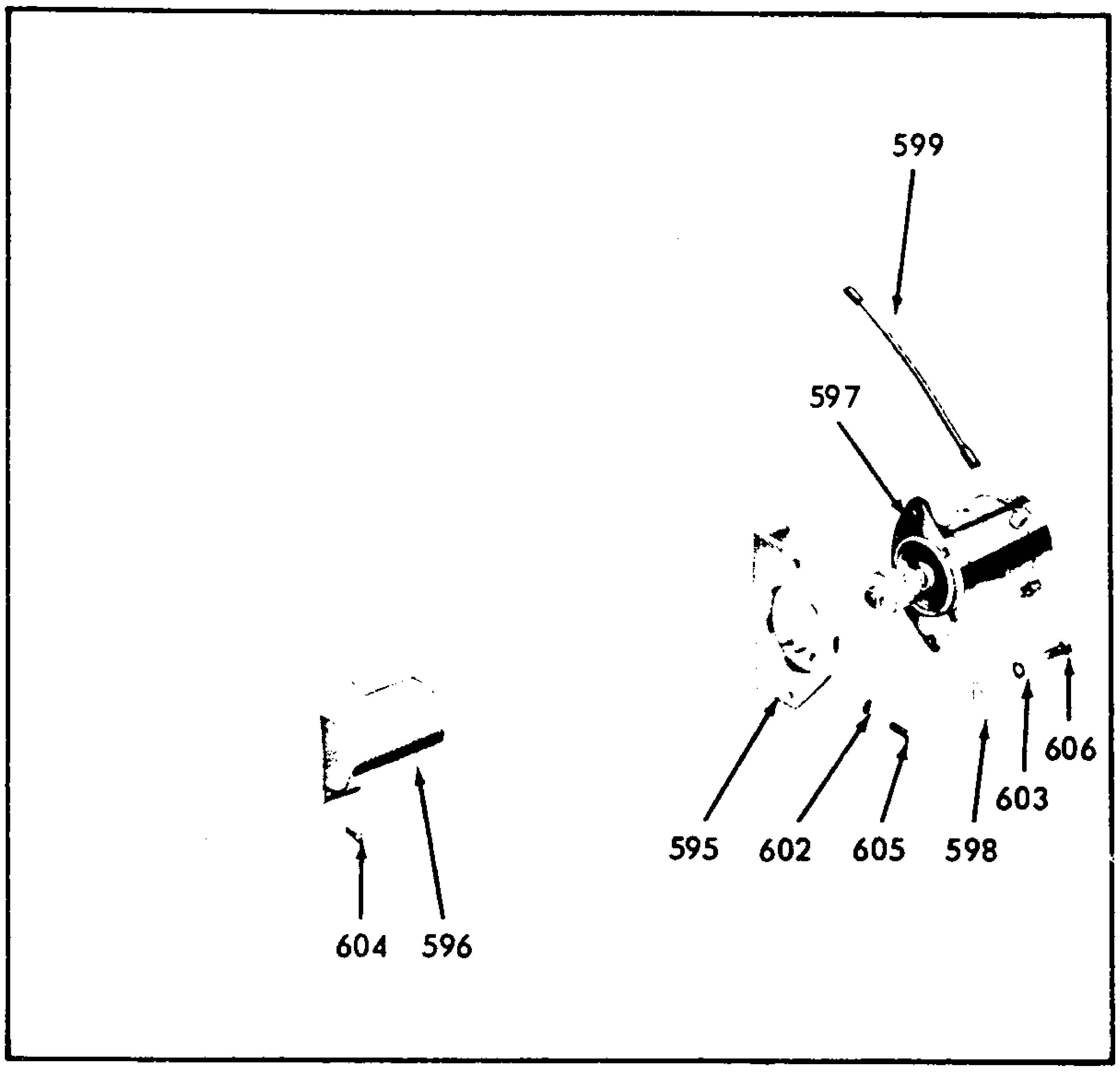
Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
570	PG-556-2	**CLAMP** for mounting coil PG-556, replaced by PG-556-2.	1		4
571	TF-116	**IGNITION TIMER ASSEMBLY** Consisting of:	1	4	8
572		**BH-151-B** Cover (sheet steel) replaces cast iron cover BH-151 and QD-711 gasket	1		2
573		**GD-130** Drive gear	1		8
574		**PA-313** Pin for gear	1		1
576		**JK-59** 'O' ring seal for adapter	1		1
577		**PE-3** ¼" lockwasher for advance arm	1		1
578		**PE-5** 3/8" lockwasher for adapter mounting	2		1
579		**QD-616** Gasket for adapter	1		1
581		**TB-107A-1** Adapter	1	1	8
582		**XD-4** Screw for advance arm lock	1		1
583		**XD-34** Screw for adapter mounting	2		1
584		**YF-8D-S1** Ignition timer with cover YF-8B-S1 and YF-8-S1 replaced by YF-8D-S1. **NOTE:** For ignition timer service parts, refer to illustration following this parts list.	1	2	
585	HF-337	**SPACER**, 13/32" I.D. x 17/64" long For mounting ignition coil.	1		1
586	XD-30	**SCREW**, 3/8"-16 thread x 1½" long, hex. head, for ignition coil mounting	1		1
587	YF-5-B	**IGNITION COIL** (12 volt) Prestolite No. 200687	1	1	12
588	YL-180	**IGNITION WIRE ASSEMBLY**, coil to timer, 17½" long, with terminals	1		1
589	YL-339-24	**IGNITION CABLE ASSEMBLY**, coil to spark plug YL-319-B, replaced by YL-339-24.	1		2

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

12 VOLT ELECTRIC STARTING MOTORS FOR AGND ENGINE

4" DIAMETER STARTING MOTOR

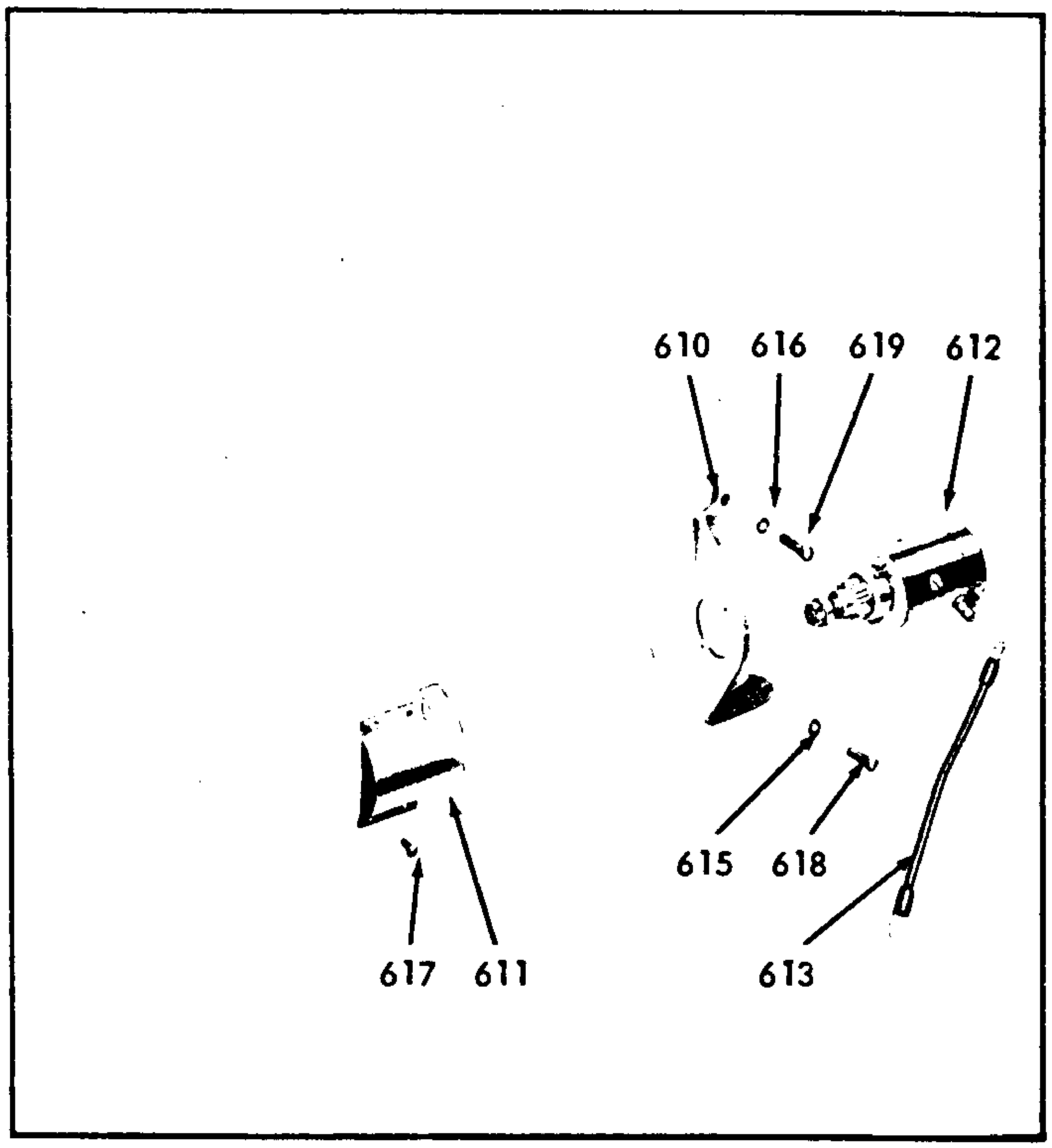
FOR ENGINES BEGINNING WITH SERIAL NO. 3,252,140



263774C

3" DIA. (Obsolete) STARTING MOTOR

FOR ENGINES UP TO AND INCLUDING SERIAL NO. 3,252,139



263773C

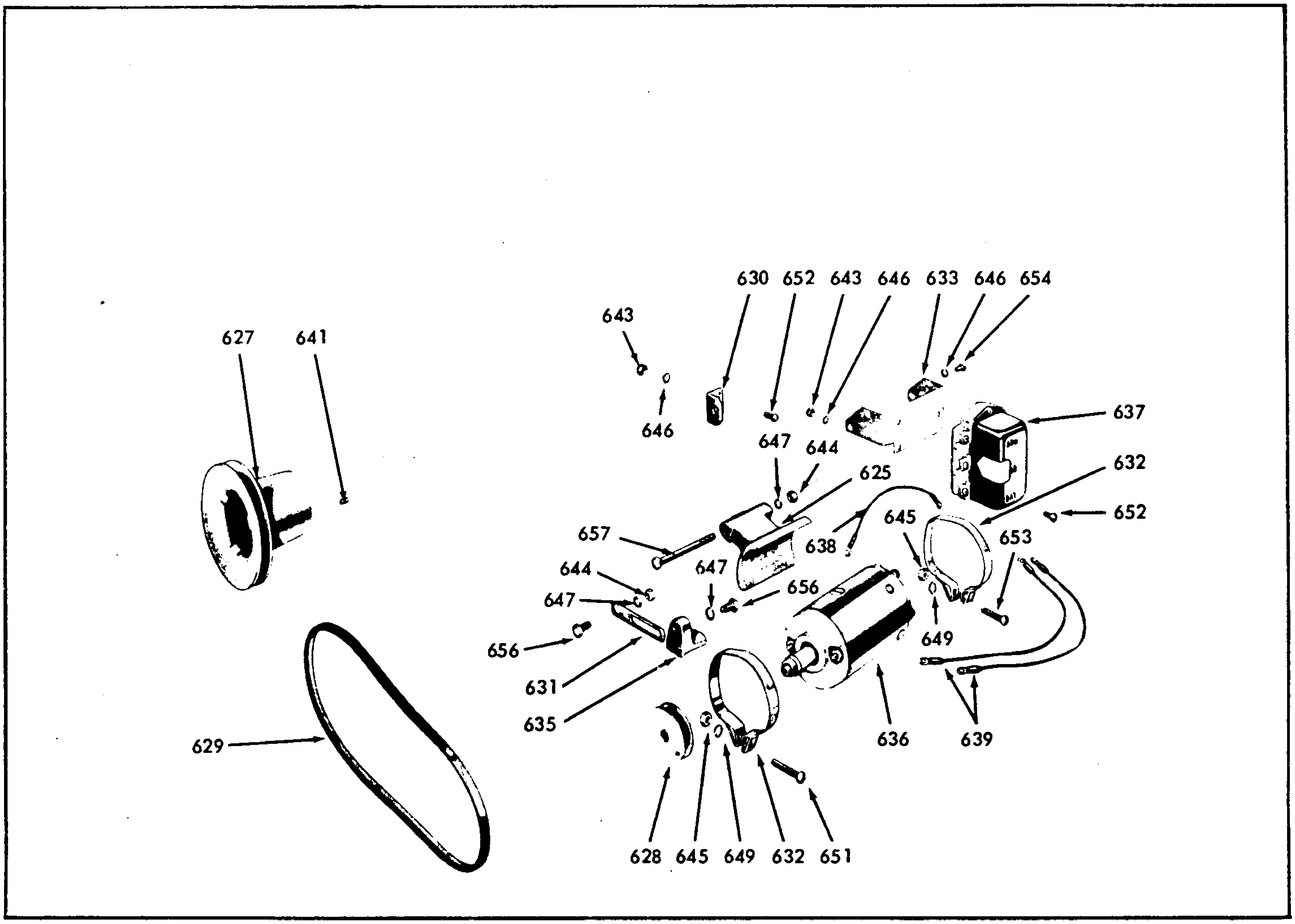
NOTE: Engines equipped with electric starting motor require special **CRANKCASE, FLYWHEEL, AIR SHROUD** and **BASE**, as designated by engine specification number.

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
595	BI-360	**BRACKET** for starter mounting	1	2	
596	SE-177-1	**COVER** for starter Bendix	1		3
597	YA-39	**STARTING MOTOR** (12 volt) For engines beginning with Serial No. 3,252,140. Replaces YA-35 but not interchangeable for service. **NOTE:** For starting motor service parts, refer to illustration following this parts section.	1	11	
598	YD-296	**TERMINAL** for ground strap connection	1		1
599	YL-182	**STARTER CABLE** to starter switch.... No. 4 A.W.G. cable, 10" long, with terminals.	1		6
		STANDARD HARDWARE			
602	PE-4	**LOCKWASHER**, 5/16" Positive For starter bracket mounting.	3		1
603	PE-5	**LOCKWASHER**, 3/8" Positive For starter to bracket mounting.	2		1
604	XA-73	**SCREW**, No. 7 x 3/8" long, self-tapping round head For starter Bendix cover.	4		1
605	XD-17	**SCREW**, 5/16"-18 thread x 1" long, hexagon head For starter bracket mounting.	3		1
606	XD-27	**SCREW**, 3/8"-16 thread x 1" long, hexagon head For starter to bracket (top hole).	1		1
	XD-29	3/8"-16 thread x 1¼" long, hex. head ... For starter to bracket (bottom hole).	1		1

Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
610	BI-343-3	**STARTER BRACKET**, used with YA-35 starter, engine Serial No. 3,147,658 to and including 3,252,139 BI-343 Bracket, used with YA-27 and YA-27-A starters, to and including engine Serial No. 2,981,587. BI-343-2 Bracket, used with YA-27-B starter, for engine Serial No. 2,981,588 thru 3,147,657.	1	1	8
611	SE-229-A	**COVER** for starter Bendix	1		2
612	YA-35	**WISCONSIN STARTING MOTOR** (12 volt) For engine Serial No. 3,147,658 to and including 3,252,139. YA-27, YA-27A and YA-27-B used on engines previous to Serial No. 3,147,658. For replacement, use YA-35-S1 starter and bracket assembly. **NOTE:** For starting motor service parts, refer to illustration following this parts section.	1	6	
613	YL-182	**STARTER CABLE** to starter switch .... No. 4 A.W.G. cable, 10" long, with terminals.	1		6
		STANDARD HARDWARE			
615	PE-4	**LOCKWASHER**, 5/16" Positive For starter bracket, lower holes.	2		1
616	PE-5	**LOCKWASHER**, 3/8" Positive For starter bracket, upper hole.	1		1
617	XA-73	**SCREW**, No. 7 x 3/8" long, self-tapping, round head. For starter Bendix cover	4		1
618	XD-16	**SCREW**, 5/16"-18 thread x 7/8" long, hexagon head For lower starter bracket holes.	2		1
619	XD-30	**SCREW**, 3/8"-16 thread x 1½" long, hexagon head For starter bracket and coil.	1		1

12 VOLT GENERATOR MOUNTING

For Model AGND Engine



263772C

NOTE: Engines equipped with generator require special **ENGINE BASE, FLYWHEEL, AIR SHROUD, SCREEN** and **FUEL TANK BRACKET.** Refer to engine specification for correct part numbers.

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
625	BI-295-4	**CRADLE** for mounting generator	1	1	8
627	MD-303-1	**PULLEY** for driving generator	1	3	6
628	MD-370	**PULLEY** (2" O.D.) for generator	1		8
629	MH-173	**DRIVE BELT** (3/8" wide x 29" outside) For generator. MH-168, 28" long, replaced by MH-173.	1		4
630	PG-535	**BRACKET** for generator adjusting strap	1		1
631	PG-844	**ADJUSTING STRAP** for generator	1		1
632	PG-851	**STRAP** for mounting generator	2		1
633	PG-853	**BRACKET** for voltage regulator mtg.	1		4
635	VC-34	**SUPPORT** for generator adjusting strap	1		3

Ref. No.	Part Number	Description	No. Req	Net Wt. Lb	Net Wt. Oz
636	YB-47-C	**GENERATOR** (12 volt—negative grd.) .. **PRESTOLITE** No. **GJG-4010M,** for engines beginning with serial No. 3995611.	1	8	
		YB-47-A (12 volt—positive ground) .... Prestolite No. GJG-4001MP, for engines previous to serial No. 3995611. **For replacement** use **YB-47-C** neg. grd. generator and **YJ-33-K** neg. grd. regulator.		8	
		YB-47 (GJG-4001M neg. grd.), replaced by YB-47-C and YJ-33-K regulator.			
		NOTE: For service parts, refer to illustration following this parts list.			
637	YJ-33-K	**CURRENT-VOLTAGE REGULATOR**.... (12 volt—negative ground). **PRESTOLITE** No. **VBO-4201-Y1,** used with YB-47-C Generator. **YJ-33-J** (positive ground) Prestolite No. VBO-4201-Z1, used with YB-47-A Generator. YJ-33-B, replaced by YJ-33-J.	1	2	

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

12 VOLT GENERATOR MOUNTING

For Model AGND Engine

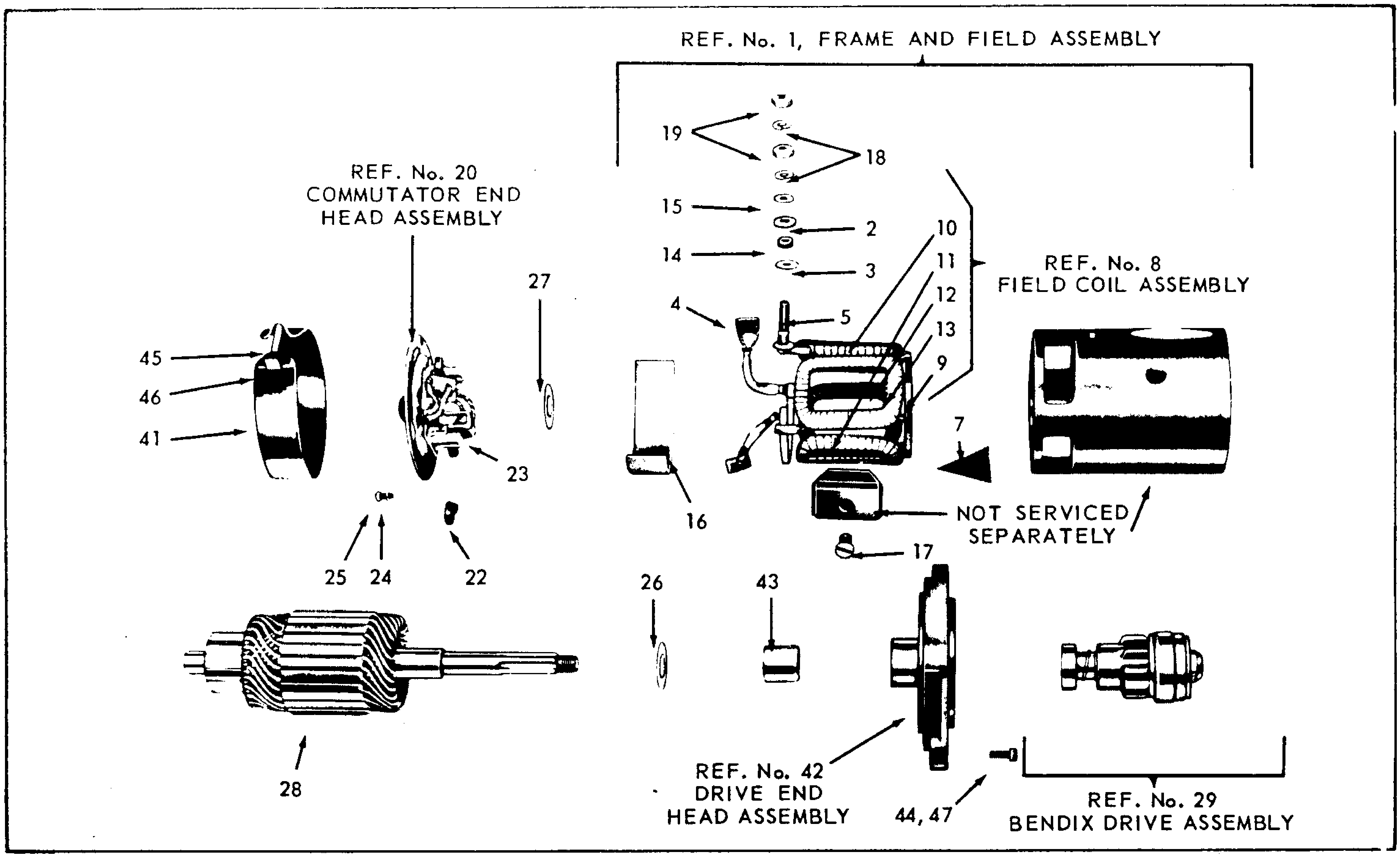
Ref. No.	Part Number	Description	No. Req	Net Wt.	
				Lb	Oz
638	YL-352-8	**IGNITION WIRE ASSEMBLY,** ammeter to regulator, battery terminal.	1		1
639	YL-352-14	**IGNITION WIRE ASSEMBLY,** regulator to generator, field and armature terminals.	2		1
	YL-355-13	**GROUND WIRE,** regulator to generator frame (not illustrated)	1		1
		STANDARD HARDWARE			
641	PA-250	**DRIVE PIN,** ¼" O.D. x 3/8" long, steel .. For drive pulley.	1		1
643	PD-77	**NUT,** ¼"-20 thread, hexagon steel .... 2-for generator adjusting strap bracket. 3-for regulator mounting.	5		1
644	PD-78	**NUT,** 5/16"-18 thread, hexagon steel .... 1-for generator adj. strap to bracket. 1-for generator cradle screw.	2		1
645	PD-115	**NUT,** No. 10-32 thread, hexagon steel ... For generator straps.	2		1
646	PE-3	**LOCKWASHER,** 1/4" spring lock .... 2-for generator adj. strap bracket. 4-for regulator bracket. -for regulator mounting.	9		1
647	PE-4	**LOCKWASHER,** 5/16" spring lock .... 1-for generator cradle screw. 2-for generator adjusting strap.	3		1
649	PE-14	**LOCKWASHER,** No. 10 spring lock .... For generator strap screws.	2		1
651	XA-11	**SCREW,** No. 10-32 thread x 1½" long, round head .... For generator strap.	1		1
652	XA-34	**SCREW,** ¼"-20 thread x 1/2" long, indented, hexagon head .... 2-for generator adj. strap bracket. 3-for voltage regulator mounting.	5		1
653	XA-56	**SCREW,** No. 10-32 thread x 1¼" long, round head .... For generator strap.	1		1
654	XD-4	**SCREW,** ¼"-20 thread x ½" long, hex. hd. For voltage regulator bracket.	4		1
656	XD-14	**SCREW,** 5/16"-18 thread x 5/8" long, hexagon head .... For generator adjusting strap.	2		1
657	XD-155	**SCREW,** 5/16"-18 thread x 2¼" long, hexagon head .... For generator cradle mounting.	1		2

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

PRESTOLITE MBG-4124 (12 Volt) STARTING MOTOR – WISCONSIN MOTOR No. YA-39

For AGND Engines beginning with Serial No. 3,252,140



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NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
1		FRAME and FIELD ASSEMBLY, includes:	1
2	**	INS. WASHER for terminal stud, outer	1
3	**	INS. WASHER for terminal stud, inner	1
4	*	BRUSH	2
5	**	TERMINAL STUD	1
6		CONNECTOR (Not illustrated)	1
7		INSULATION for field connection, D.E.	1
8	28-MBG-3005AS	**FIELD COIL ASSEMBLY**	1
		Consisting of:	
9		CONNECTOR for field coil	2
10		FIELD COIL, U.L.	1
11		FIELD COIL, L.R.	1
12		FIELD COIL, L.L.	1
13		FIELD COIL, U.R.	1
14	**	INSULATING BUSHING for terminal stud	1
15	**	PLAIN WASHER, 5/16", for terminal stud	1
16		INSULATION for field coils	1
17		SCREW for pole shoe	4
18		LOCKWASHER, 5/16", for terminal stud	2
19		NUT for term. stud, 5/16"-24 thread, hex.	2
20	28-MZ-2002Q	**COMMUTATOR END HEAD ASSEMBLY**	1
		Includes:	
21		FELT (Not illustrated)	1
22	28-MZ-19S	**BRUSH SPRING SET**	4
23	*	GROUNDED BRUSH	2
24		LOCKWASHER for head screw, No. 10	3
25		SCREW for head mounting No. 10-32 thread x 3/8" long, fillister head.	3
26	***	THRUST WASHER, D.E., 1/32" thick	1
27	***	THRUST WASHER, C.E., 1/32" thick	1
	***	3/64" thick	†
	***	.080" thick	†
		† Use as required.	
28	28-MZ-2375	**ARMATURE ASSEMBLY**	1
29	28-480018	**BENDIX DRIVE ASSEMBLY** Prestolite No. 28-EBB-87-A.	1
41	28-MZ-24A	**COVER BAND**	1
42	28-MZ-1376	**DRIVE END HEAD ASSEMBLY**	1
		Includes:	
43	28-MAK-39	**BRONZE BEARING**	1
44		LOCKWASHER, No. 10, for D.E. head	4
45		SCREW for cover band, No. 10-32 thread x 1½" long, round head	1
46		NUT for cover band, No. 10-32, square	1
47		SCREW for drive end head No. 10-32 thread x 1/2" long, socket head.	4

* **28-MBG-2012S BRUSH SET**

** **28-P90-333 TERMINAL STUD PACKAGE**

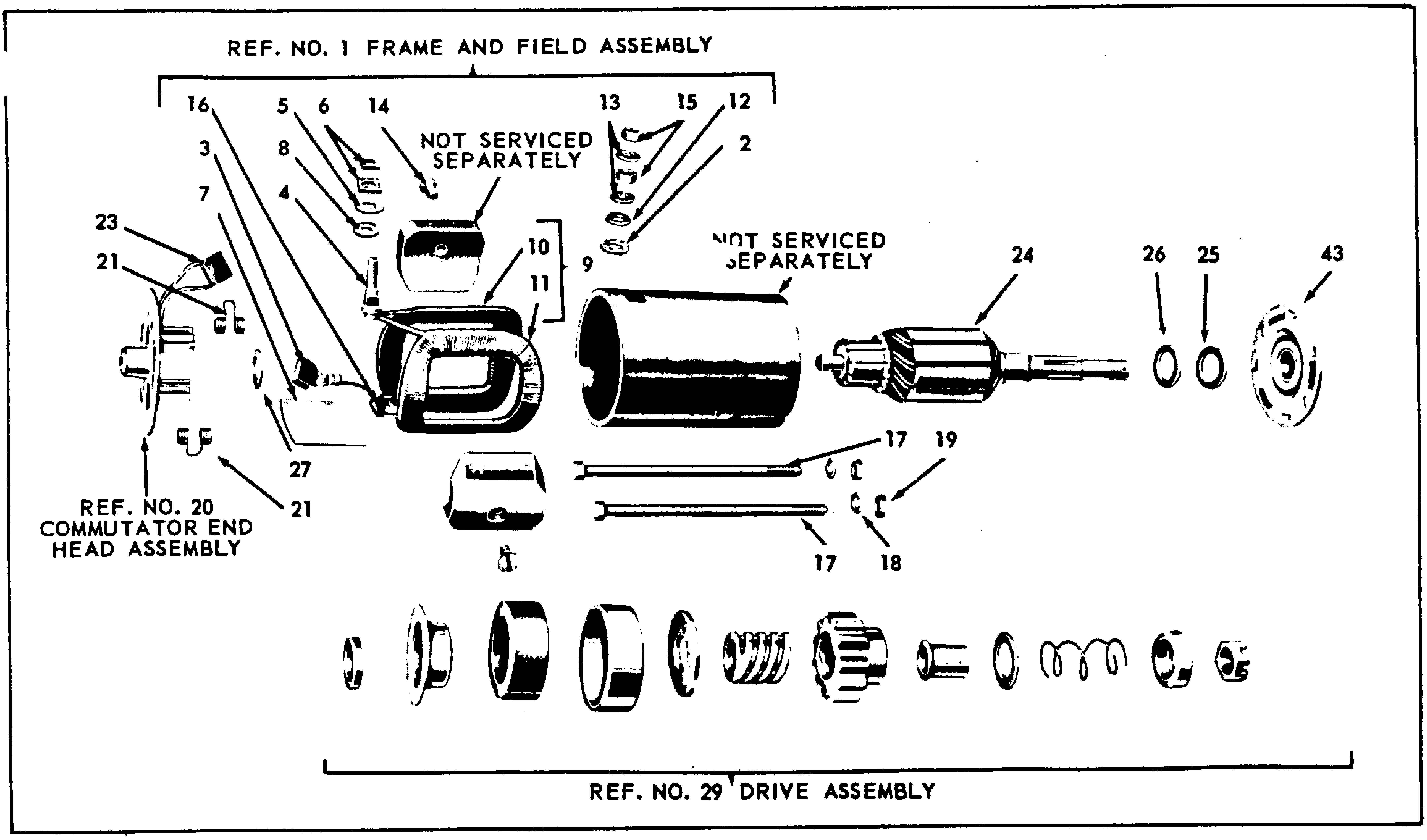
*** **28-P90-542 ARMATURE THRUST WASHER PKG.**

NOTE: Parts less part number are not serviced separately.

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

PRESTOLITE MDW-4003M (12 Volt) STARTING MOTOR – WISCONSIN MOTOR No. YA-27-B
† PRESTOLITE MDW-4304M (12 Volt) STARTING MOTOR – WISCONSIN MOTOR No. YA-27-A

For AGND Engines previous to Serial No. 3,147,658


REF. NO. 1 FRAME AND FIELD ASSEMBLY
16
5
6
14
13
15
12
3
8
NOT SERVICED SEPARATELY
2
7
4
23
21
10
9
11
NOT SERVICED SEPARATELY
24
26
25
43
17
19
27
REF. NO. 20 COMMUTATOR END HEAD ASSEMBLY
21
17
18
REF. NO. 29 DRIVE ASSEMBLY

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† WAS PRESTOLITE NUMBERS MDW-4302M AND MDW-4002M.

NOTE: YA-27-B has a 9 tooth pinion and YA-27-A has an 11 tooth pinion. All other parts are identical for both starting motors, except for Bendix drives as noted below in parts list.

Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
1	28-MDW-3001	**FRAME** and **FIELD ASSEMBLY**	1
		Consisting of:	
2		INSULATING WASHER for term. stud, outer	1
3	*	BRUSH	1
4		TERMINAL STUD	1
5	*	INSULATING WASHER for term. stud, inner	1
6		INSULATING BUSHING for terminal stud	2
7		INSULATION for field connection	1
8		PLAIN WASHER for terminal stud, inner	1
9		FIELD COIL ASSEMBLY	1
		Consisting of:	
10		FIELD COIL, left	1
11		FIELD COIL, right	1
12		PLAIN WASHER for terminal stud	1
13		LOCKWASHER, ¼", for terminal stud	2
14		SCREW for pole shoe	2
15		NUT for terminal stud, ¼"-20 thread, hex.	2
16		CONNECTOR for field coil	1
17	**	**THRU BOLT**, 6¼" long	1
	**	**THRU BOLT**, 6-3/8" long	1
18	**	**LOCKWASHER**, ¼", for thru bolt	2
19	**	**NUT** for thru bolt, ¼"-20 thread, hexagon	2
20	28-MDW-1002	**COMMUTATOR END HEAD ASSEMBLY** Replaces MDO-3002. Includes:	1
21	28-MDH-18S	BRUSH SPRING	2
22		FELT (not illustrated)	1
23	*	GROUNDED BRUSH	1

Ref. No.	Part Number	Description	No. Req.
24	28-MDW-2306	**ARMATURE ASSEMBLY** Replaces MDW-2006.	1
25	***	**THRUST WASHER**, D.E., 1/32" thick	1
26	***	**THRUST WASHER**, D.E., .042" thick	1
27	***	**THRUST WASHER**, C.E., 1/32" thick (if required)	1
29	28-478917	**BENDIX DRIVE ASSEMBLY**, for YA-27-B Prestolite No. 28-MDW-1161.	1
	28-480175	**BENDIX DRIVE ASSEMBLY**, for YA-27-A Prestolite No. 28-MGD-1161, MGD-1161A. Replaces 28-EBB-56A.	1
43	28-MDO-1003	**DRIVE END HEAD ASSEMBLY**	1

* 28-MDO-2012AS BRUSH SET

** 28-P90-289 THRU BOLT PACKAGE

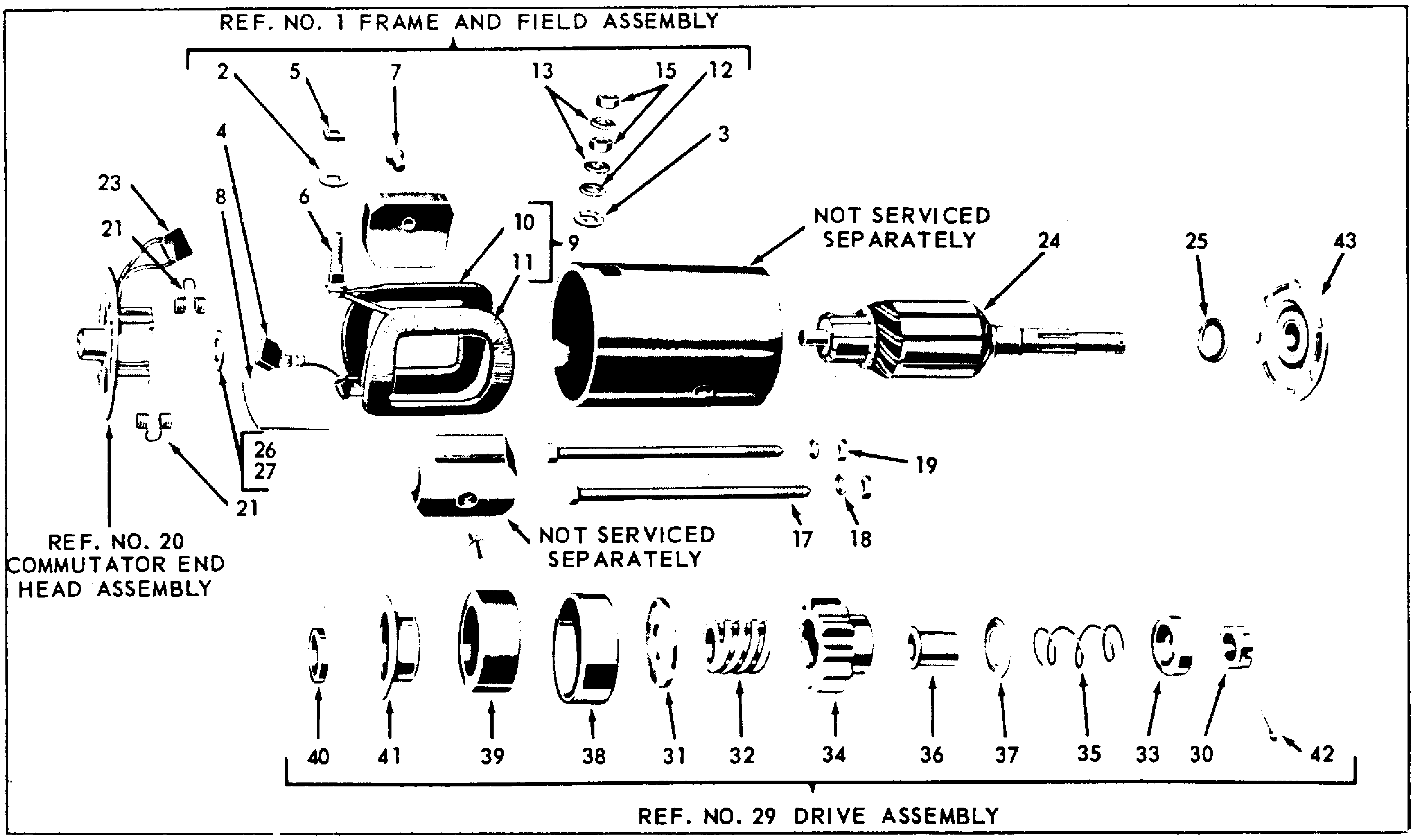
*** 28-P90-259 ARMATURE THRUST WASHER PKG.

NOTE: Parts less part number are not serviced separately.

STARTING MOTOR – 12 VOLT, 3" DIAMETER

WISCONSIN PART NUMBER YA-35

For AGND Engines, Serial No. 3,147,658 To and Including 3,252,139



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NOTE: Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
1	28-MDH-3001	**FRAME and FIELD ASSEMBLY**, includes: ..	1
2		INSULATING WASHER for term. stud, inner	1
3		INSULATING WASHER for term. stud, outer	1
4	*	BRUSH	1
	*	BRUSH	1
5		INSULATING BUSHING for terminal stud ..	2
6		TERMINAL STUD	1
7		SCREW for pole shoe	4
8		INSULATION for field connection	1
9		FIELD COIL ASSEMBLY	1
		Consisting of:	
10		FIELD COIL, left	1
11		FIELD COIL, right	1
12		PLAIN WASHER for terminal stud	1
13		LOCKWASHER, ¼", for terminal stud	2
15		NUT for terminal stud, ¼"-20 thread, hex.	2
17	28-MDH-20S	**THRU BOLT PACKAGE**	2
18		**LOCKWASHER**, ¼", for thru bolt	2
19		**NUT** for thru bolt, ¼"-20 thread, hexagon	2
20	28-MDH-3002	**COMMUTATOR END HEAD ASSEMBLY**	1
		Includes:	
21	28-MDH-18S	BRUSH SPRING	4
22		FELT (not illustrated)	1
23	*	GROUNDED BRUSH	2
24	28-MDH-2006	**ARMATURE ASSEMBLY**	1
25	**	**THRUST WASHER**, D.E., 1/32" thick	1
26	**	**THRUST WASHER**, C.E., .045" thick	1
27	**	**THRUST WASHER**, C.E., 1/32" thick	1
29	**ORDER INDIVIDUAL PARTS**	**BENDIX DRIVE ASSEMBLY**, Eclipse Machine Division, Bendix Aviation Corp. .... Consisting of the following Eclipse parts.	1
30	28-F-4755	CASTELLATED NUT	1
31	28-478046	THRUST WASHER	1
32	28-478919	SCREW SHAFT	1
33	28-478831	PINION STOP	1
34	28-478918	PINION (9 tooth)	1
35	28-478268	ANTI-DRIFT SPRING	1
36	28-478274	ANTI-DRIFT SLEEVE	1
37	28-478832	PINION WASHER	1
38	28-478041	CUSHION CUP	1
39	28-478042	CUSHION	1
40	28-478047	SPACER	1
41	28-478039	THRUST CUP WASHER	1
42	28-F-5982	COTTER PIN	1
43	28-MDH-1003	**DRIVE END HEAD ASSEMBLY**	1

* **28-MDH-2012S BRUSH SET**

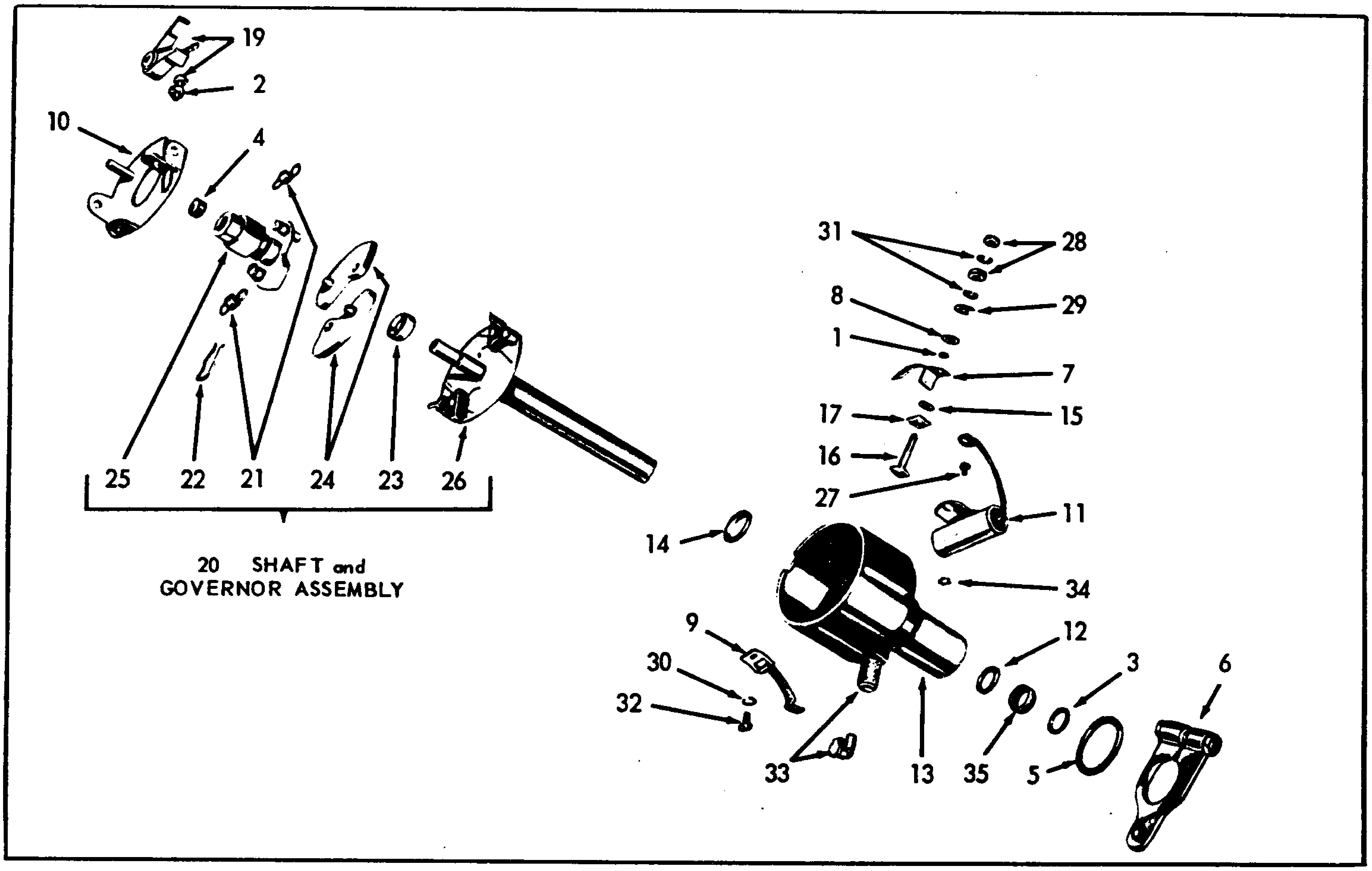
** **28-P90-259 ARMATURE THRUST WASHER PACKAGE**

NOTE: Items less part number are not serviced separately.

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

YF-8-D-S1 IGNITION TIMER – Prestolite No. IGW-4407

OBSOLETE TIMERS, YF-8-B-S1 (IGW-4402) and YF-8-S1 (IGW-4167)



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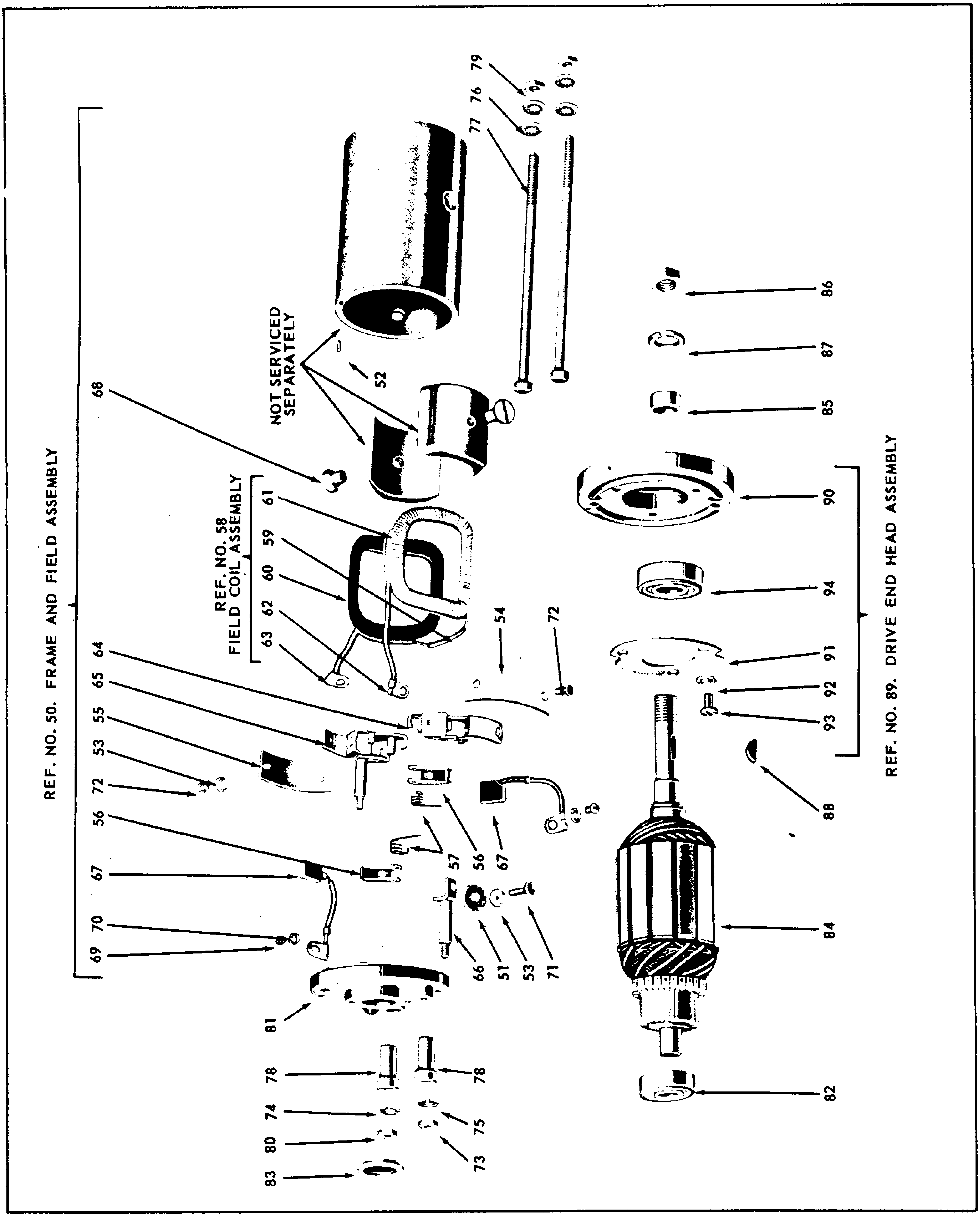
NOTE:
YF-8-D-S1 Ignition Timer (IGW-4407) replaces YF-8-B-S1 (IGW-4402) and YF-8-S1 (IGW-4167). Primary change is the addition of an oil seal in the base replacing oil grooves in the drive shaft. Timers are interchangeable, as are most of the internal parts, except where noted by the Prestolite Timer No's.

Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
1	**	**INSULATING BUSHING** for terminal stud	1
2		**LOCKNUT** for contact screw	1
3	*	**THRUST WASHER** for drive shaft	1
4	28-IG-495	**FELT WICK** for cam sleeve.....................	1
5	28-IG-816A	**THRUST WASHER** for advance arm	1
6	28-IG-1860A-1	**ADVANCE ARM** for IGW-4402 & 4167	1
	28-IG-860A	**ADVANCE ARM** for IGW-4407	
7	**	**INSULATION** for terminal stud	1
8	**	**INSULATION WASHER** for terminal stud	1
9	28-IGB-1007S	**CLAMP SPRING** and **HINGE PACKAGE**	1
10	28-IGB-1010	**BREAKER PLATE**	1
11	28-IAT-3076ES	**CONDENSER**	1
12	28-IAU-10	**WASHER** for shaft seal (for IGW-4407)....	1
13		BASE ASSEMBLY, includes:....................	1
	*	BRONZE BEARING (not illustrated)	2
14	*	THRUST WASHER for drive shaft, upper	1
15	**	INSULATING WASHER for terminal stud	1
16	**	TERMINAL STUD	1
17	**	WASHER for terminal stud	1
18	28-IGW-188	**FELT WICK** for oiler (not illustrated)	1
19	28-IGW-3028YS	**BREAKER CONTACT SET**	1
20		SHAFT and GOVERNOR ASSEMBLY	1
21	28-IGB-397S	**SPRING SET**, gov. weights (IGW-4407, -4402)	1
	28-IGB-301S	**SPRING SET**, gov. weights (IGW-4167)	1
22	*	CAM RETAINING SPRING	1
23	*	CAM SPACER	1
24	28-IGW-1014RBS	**GOVERNOR WEIGHT SET**	1
25	28-IGW-2100RAK	**CAM & STOP PLATE** (IGW-4407,-4402)	1
	28-IGW-2100RAD	**CAM & STOP PLATE** (for IGW-4167) ..	
26	28-IGW-2113R	**DRIVE SHAFT** (for IGW-4407)	1
	28-IGW-2103R	**DRIVE SHAFT** (for IGW-4402,-4167)	
27		SCREW for condenser 8-32 x 3/16" rd.hd.	1
28		NUT for terminal stud, 10-32, hexagon ..	2
29		WASHER for terminal stud, No. 10 plain	1
30		LOCKWASHER for breaker plate, No. 8	3
31		LOCKWASHER for terminal stud, No. 10	2
32		SCREW for breaker plate 8-32x5/16" rd.hd.	3
33	28-X-1590	**OILER** (elbow type) for IGW-4402 & 4167	1
	28-X-2961	**OILER** for IGW-4407	
34		WASHER for condenser mounting #8	1
35	*	SHAFT OIL SEAL (for IGW-4407)	1
*	**28-P90-331A**	**Dist. Shaft Brg. & Parts Pkg. for IGW-4402 & 4167.**	
	28-P90-713	**Dist. Shaft Brg. & Parts Pkg. for IGW-4407.**	
**	**28-P90-330**	**Terminal Stud & Parts Package**	
	NOTE: Parts less part number are not serviced separately.		

WISCONSIN MOTOR No. YB-47-C GENERATOR (Negative Grd.–12 Volt), PRESTOLITE GJG-4010M
Obsolete YB-47-A GENERATOR (Positive Grd.–12 Volt), GJG-4007MP

YB-47 (GJG-4001M Neg. Grd.) replaced by YB-47-C



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Parts are identified by reference number. See parts list for correct part number.

WISCONSIN MOTOR No. YB-47-C GENERATOR (Negative Grd.–12 Volt), PRESTOLITE GJG-4010M
Obsolete YB-47-A GENERATOR (Positive Grd.–12 Volt), GJG-4007MP

YB-47 (GJG-4001M Neg. Grd.) replaced by YB-47-C

NOTE: YB-47-A (GJG-4007MP) was Prestolite No. GJG-4001MP. The Frame – Field Coil Assembly and Armature were changed, as noted in parts list.

Code number 28, prefixed to the part number, is a vendor identification. When ordering parts, please use number with code as shown.

Ref. No.	Part Number	Description	No. Req.
50	28-GJG-2101	**FRAME, FIELD** and **COIL ASSEMBLY** GJG-2001, replaced by 28-GJG-2101. Consisting of:	1
51		INSULATING WASHER for field terminal	1
52		DOWEL PIN	2
53	**	INSULATING BUSHING for field terminal and insulated brush holder	3
54		SPACER for ground brush holder	1
55	**	INSULATION for brush holder	1
56	***	BRUSH ARM	2
57	***	BRUSH SPRING	2
58		FIELD COIL ASSEMBLY Consisting of:	1
59		INSULATING TUBE	1
60		FIELD COIL, left	1
61		FIELD COIL, right	1
62		TERMINAL	1
63		TERMINAL	1
64	*	HOLDER for ground brush	1
65	**	INSULATED HOLDER for brush and arm terminal	1
66	28-GJG-1038	**FIELD TERMINAL**	1
67	28-GJG-2012S	**BRUSH SET** for service	1
68		POLE SHOE SCREW	2
69		SCREW for brush lead, No. 6-32 thread x 3/16" long, round head	2
70		LOCKWASHER for lead screw, No. 6	2
71		FIELD TERMINAL RIVET	1
72	*	BRUSH HOLDER SCREW, #4-40 x 1/2"	4
73		NUT for field terminal, No. 8-32 thread, hex.	1
74		PLAIN WASHER for armature terminal, No. 10	1
75		PLAIN WASHER for field terminal, No. 8	1
76		WASHER for thru bolt, 1¼" Shakeproof	4
77	28-GJG-20S	**THRU BOLT PACKAGE**	2
78	28-GJG-26	**INSULATING BUSHING** for terminal stud	2
79		NUT for terminal stud, ¼"-20 thread, hex.	2
80		NUT for armature terminal, No. 10-32 thread, hexagon	1

Ref. No.	Part Number	Description	No. Req.
81	28-GJG-2	**COMMUTATOR END HEAD**	1
82	28-GJG-45	**BALL BEARING** for commutator end head	1
83	28-GAL-40C	**BEARING COVER** for commutator end head	1
84	28-GJG-2306S	**ARMATURE** GJG-2006M, GJG-2106, replaced by 28-GJG-2306S.	1
85	28-GJG-27	**SPACER** for armature shaft	1
86	28-P90-673	**NUT, WASHER PKG.,** for armature shaft	1
87		LOCKWASHER for armature shaft, drive end	1
88		KEY for driven pulley, No. 2 Woodruff	1
89	28-GJG-1003	**DRIVE END HEAD ASSEMBLY** (for YB-47, YB-47A)	1
	28-GJG-1103	**DRIVE END HEAD ASSEMBLY** (for YB-47C) Consisting of:	1
90		DRIVE END HEAD	1
91		BEARING RETAINER	1
92		LOCKWASHER for retainer screw, No. 10	3
93		SCREW for bearing retainer, No. 10-32 thread x 5/16" long, binding head	3
94	28-GJG-44	**BEARING** for drive end head	1

* **28-P90-251 Ground Brush Holder & Parts Pkg.**

** **28-P90-252 Ins. Brush Holder & Parts Pkg.**

*** **28-P90-253 Brush Arm & Spring Package**

NOTE: Parts less part number are not serviced separately.

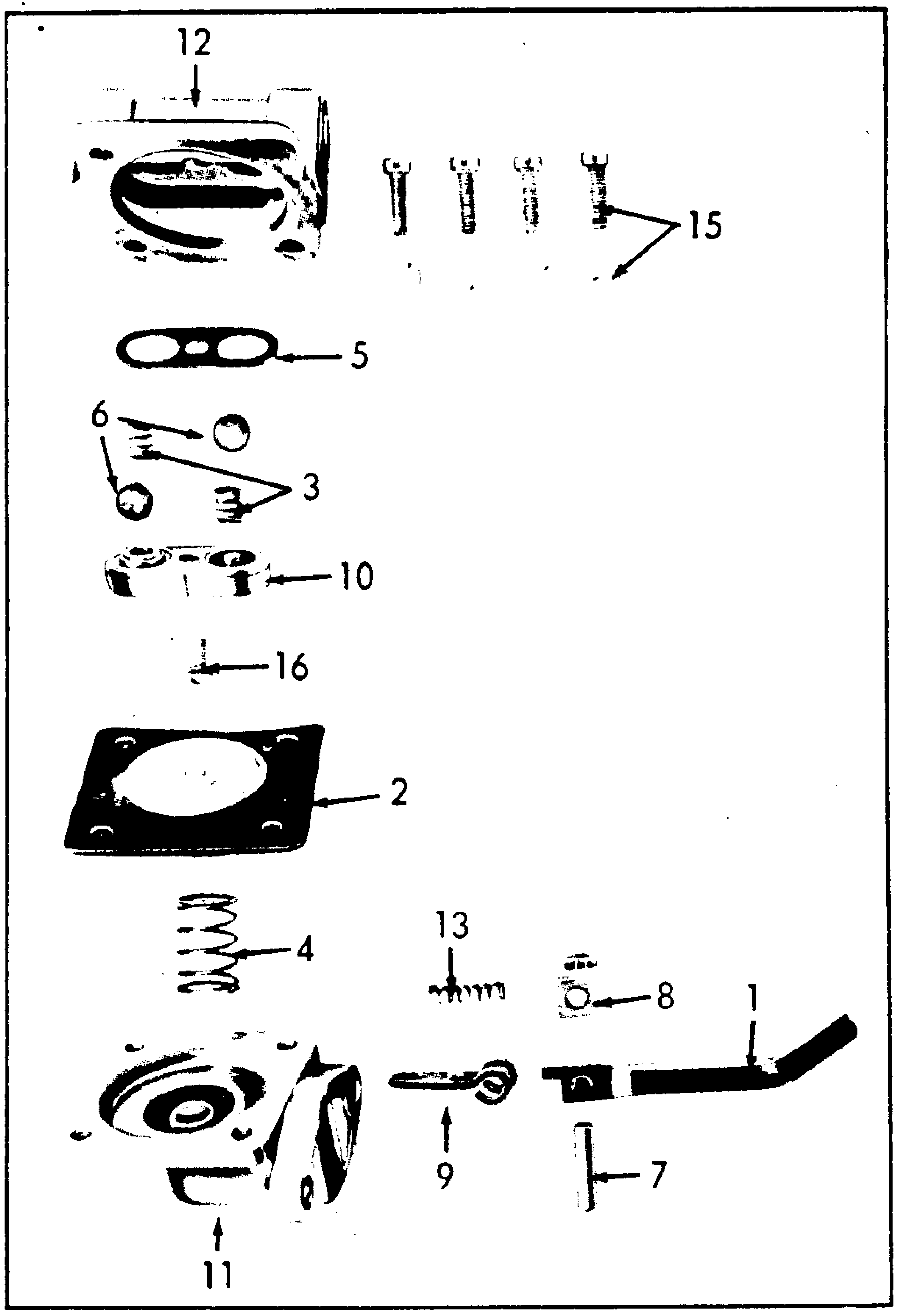
Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

INSTRUCTIONS FOR MAINTENANCE AND REPAIR OF FUEL PUMP

WISCONSIN MOTOR PART NO.	ENGINE MODELS USED ON
LP-42-A	TH
LP-42-B	ACN, BKN, AENL
LP-42-G	AGND

The fuel pump, like all other parts of the engine, is subject to wear and you will find that any time after 500 hours of use, its efficiency will gradually decrease. This is indicated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a **Wisconsin Motor No. LQ-28** diaphragm kit.

1. Remove the fuel lines and the two mounting bolts which hold the pump to the engine. Take the pump to a work bench or suitable place.
2. With file, make an indicating mark across a point at the union of castings (11 and 12). This is a positive location of the fuel line positions when reassembling. Remove four assembly screws (15) and remove fuel head.
3. Turn head (12) over and remove one screw (16). Remove (10, 3, 6 and 5) valve assemblies, noting their positions. Discard the above parts (3, 6 and 5).
4. Clean fuel head thoroughly with gasoline and a fine wire brush.
5. Holding fuel head, (12) with diaphragm surface (containing four clearance holes) up, reassemble the valve spring (3) and valve (6) into the cavity from which they were removed. Now place new gasket (5) in position and reassemble the valve retainer (10) into position and lock it by inserting and tightening the fuel pump valve retainer screw (16).



176824C

6. Place this fuel head assembly in a clean place and we are ready to rebuild the lower diaphragm section.
7. Using a screw driver, inserted into the coils of rocker arm spring (13), remove this spring and save.
8. Holding the mounting bracket (11) in the left hand with the rocker arm toward the body and the thumb nail on the end of the link (9) with the heel of the right hand on the diaphragm (2) compress the diaphragm spring (4) at the same time, turning in a clockwise position 90°. This will unhook the diaphragm from the link (9) so it can be removed.
9. Clean the mounting bracket (11) with gasoline and fine wire brush.
10. Replace the new diaphragm operating spring (4), standing it into casting (11). Repeat in reverse step eight, using the new diaphragm. Replace rocker arm spring removed in step seven.
11. Mount this assembly back on the engine in the position from which it was removed, using the new mounting gasket which is the last piece of the repair kit.
12. Crank the engine over to a position where the diaphragm (2) is laying flat on the mounting bracket (11). Place the fuel head (12) back in position so that the indicating marks of step one are in line, and start the four assembly screws approximately three turns. Again, crank the engine over to a position where the diaphragm (2) is pulled down into (11) mounting bracket and tighten the four assembly screws (15) tightly.
13. Connect the fuel lines and you have a completely rebuilt fuel pump.

NOTE: The **LQ-28 Diaphragm Kit** and the parts included there-in, which are identified by an asterisk (*), are the only parts of the fuel pump available for service.

Ref No	Description	No Req
1	ROCKER ARM	1
* 2	DIAPHRAGM	1
* 3	VALVE SPRING	2
* 4	DIAPHRAGM SPRING	1
* 5	VALVE GASKET	1
* 6	VALVE	2
7	ROCKER ARM PIN	1
8	SPRING CLIP for rocker arm	1
9	LINKAGE	1
10	VALVE PLATE and SEATS	1
11	MOUNTING BRACKET	1
12	HEAD	1
13	ROCKER ARM SPRING	1
15	ASSEM. SCREW and LOCKWASHER	4
16	VALVE PLATE SCREW and LOCKWASHER	1
*	MOUNTING FLANGE GASKET (not illustrated)	1

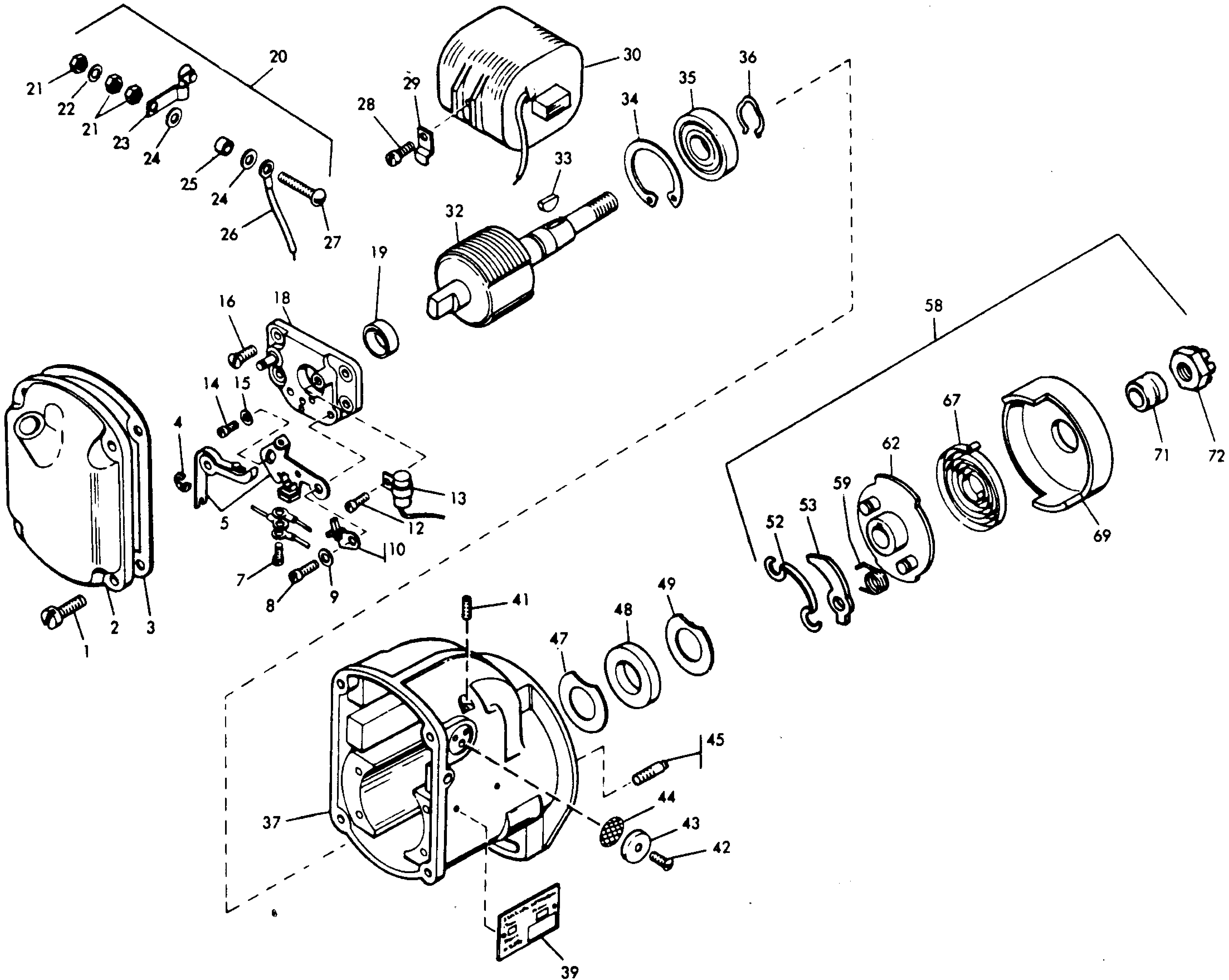
Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***
IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

Magneto Parts List

WISCONSIN Y-107 Series

Type FM-XD1B7R

Specific magnetos listed below



NOT ILLUSTRATED

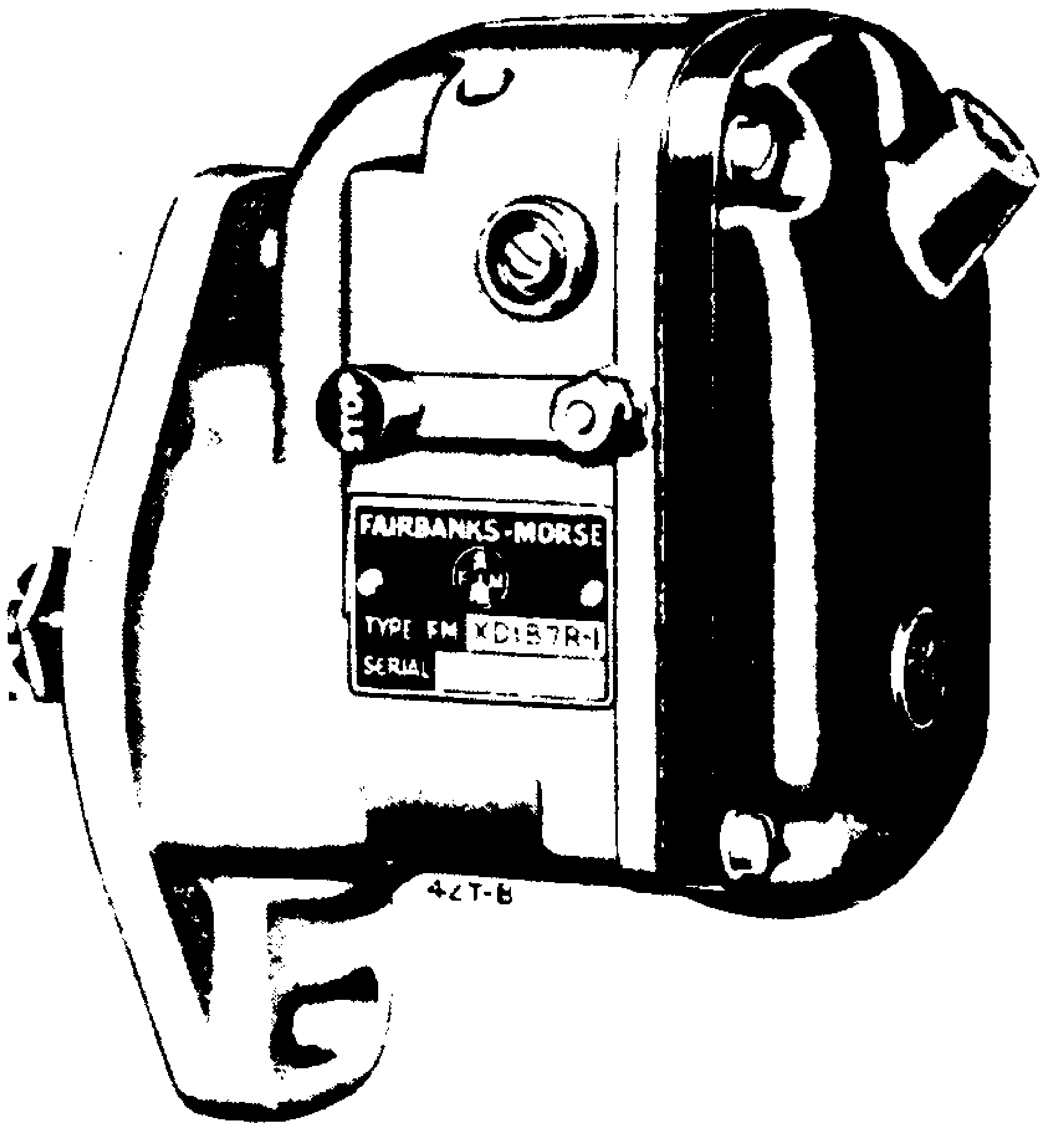
GD-125	**DRIVE GEAR**
YQ-4	**KIT**, Overhaul
YQ-7	**KIT**, Points and Condenser

NOTE: Code number 31, prefixed to the part number, is a vendor identification. When ordering parts, please use part number with code number as shown.

Ref. No.	Y-107B-S1 FMXD1B7R-1	Y-107A-S1 FMXD1B7R	Description	No. Req.
1	31-10S12D	31-10S10D	**SCREW**, end cap, 10-24	4
2	31-BZ2430	31-SX2430	**END CAP**	1
3	31-H2498	31-H2498	**GASKET**, end cap	1
4	31-C1498G	31-T1498	**SNAP RING**, fulcrum pin	1
5	31-B2437A	31-B2437A	**POINT SET** – CCW	1
7	31-6S6Z	31-6S6U	**TERMINAL SCREW**, 6-32 x 3/8	1
8	31-8S6U	31-8S6G	**SUPPORT SCREW**, 10-32 x 3/8	1
9	31-B5969	31-B5969	**WASHER**, support screw, #8	1
10	31-H2788	31-H2788	**CAM WICK**	1
12	31-8S5NA	31-8S4U	**SCREW**, condenser, 8-32	1
13	31-AXMR2433	31-AXMR2433	**CONDENSER**	1
14	31-6S6U	31-6S6U	**SUPPORT SCREW**, 6-32 x 3/8	1
15	31-D2458	31-D2458	**WASHER**, support screw, #6	1
16	31-8S6G	31-8S6G	**SUPPORT SCREW**, 8-32 x 3/8	4
18	31-W4631	31-W4631	**BEARING SUPPORT**	1
19	31-A5950A	31-A5950A	**BEARING**, cam end	1
20	31-N2514C	31-N2514C	**SWITCH** assembly	1
21	31-8N1	31-8N1	**NUT**, switch screw	3
22	31-8LW5	31-8LW5	**LOCKWASHER**, switch screw	1
23	31-M2514	31-M2514	**INSULATED LEVER**	1
24	31-C6018	31-C6018	**INSULATING WASHER**	2
25	31-K2457A	31-K2457A	**INSULATING BUSHING**	1
26	31-J2499A	31-J2499A	**WIRE** assembly	1
27	31-8S14N	31-8S16N	**SCREW**, switch, 8-32	1
28	31-6S4U	31-6S3W	**SCREW**, clip, 6-32	1
29	31-B6120	31-B6120	**COIL CLIP**	1
30	31-T2477C	31-T2477C	**COIL**	1
32	31-GS2480	31-GS2480	**ROTOR**	1
33	31-3K1	31-3K1	**KEY**, No. 3 Woodruff	1
34	31-B1498B	31-B1498B	**SNAP RING**, bearing	1
35	31-C5949	31-C5949	**BEARING**, drive end	1
36	31-B1498D	31-C1498D	**SNAP RING**, shaft	1
37	31-TW2425	31-TW2425	**HOUSING**	1
39	31-N195	31-N195	**NAME PLATE**	1
41	31-31SS14A	31-25SS14A	**SETSCREW**, coil	2

Ref. No.	Y-107B-S1 FMXD1B7R-1	Y-107A-S1 FMXD1B7R	Description	No. Req.
42	31-6S4U	31-6S4U	**SCREW,** vent cover, 6-32 x 1/4	2
43	31-B6030A	31-B6030A	**VENT COVER**	2
44	31-C6032B	31-C6032B	**VENT SCREEN**	2
45	31-F2568	31-B2568	**PIN,** pawl stop	1
47	31-A2492C	31-A2492C	**WASHER,** seal inner	1
48	31-G3861	31-G3861	**SHAFT SEAL**	1
49	31-A2492A	31-A2492A	**WASHER,** seal outer	1
52	31-A1498J		**SPRING,** pawl lock	1
53	31-Q2566		**COUPLING PAWL**	1
58	31-XV2563C-15	31-QV2563C-15	**COUPLING** complete, 15° lag angle	1
59	31-N5963	31-N5963	**PAWL SPRING**	1
62	31-EY2563-15	31-EY2563-15	**HUB** assembly, 15° lag angle	1
67	31-E2565	31-D2565	**COUPLING SPRING**	1
69	31-ZY5957	31-XY5957	**COUPLING SHELL**	1
71	31-F2572	31-F2572	**GEAR BUSHING**	1
72	31-M2570	31-M2570	**COUPLING NUT**	1

FIELD SERVICE AND ADJUSTMENT



GENERAL DESCRIPTION

The magneto gear rotates counter-clockwise, when viewed from the drive end, and is fitted with a dependable single pawl impulse coupling, which facilitates starting by providing an intensified and retarded ignition spark at low engine speeds. A two pole magnetic rotor and a single lobe cam produce one ignition spark per revolution.

SERVICE PROCEDURE

Improper functioning of the magneto is often believed to be the cause of engine difficulty arising from other sources. A brief engine inspection will often locate the trouble before the magneto is reached and prevent maladjustment of magneto parts in good condition. It is suggested that the magneto be opened only when it is certain that the ignition spark produced is unsatisfactory. This condition may be determined by an **ignition spark** test. See engine INSTRUCTION MANUAL.

SERVICING BREAKER POINTS

Remove the magneto end cap and inspect the breaker points for evidence of pitting or pyramiding. A small tungsten file or fine stone should be used to resurface the points. Badly worn or pitted points should be replaced. If it is necessary to resurface or replace the breaker points, it will also be necessary to adjust them to their proper clearance which is **0.015 in.** at full separation. Refer to engine INSTRUCTION MANUAL for **breaker point adjustment** procedure.

SEALING THE MAGNETO

Opening the magneto for breaker point adjustment or any other service, necessitates resealing the magneto upon reassembly. Clean the surface between the magneto frame and end cap and install a new gasket. Remove the vent hoods and clean the vent screens before final assembly.

FURTHER FIELD SERVICE NOT RECOMMENDED

The cam felt wick, if dry or hard, should be replaced by a new factory-impregnated wick. Other than this, these magnetos do not require field lubrication and any attempt to oil or grease the bearings is inadvisable. The lubricants should be renewed only during a complete overhaul of the magneto by a Factory-Authorized Service Station. Coil and condenser replacements are not recommended, unless test equipment is available.

DRIVE GEAR

To engage the slotted drive gear correctly with the drive lugs of the coupling, the rotor should be turned until the coupling pawl engages the stop pin. The coupling drive lugs will then be in a vertical position as shown by **A** of Fig. 1. Mount drive gear to the coupling so that the **marked tooth** is at the upper right hand, or approximate 1 o'clock position, as illustrated in view **B.**

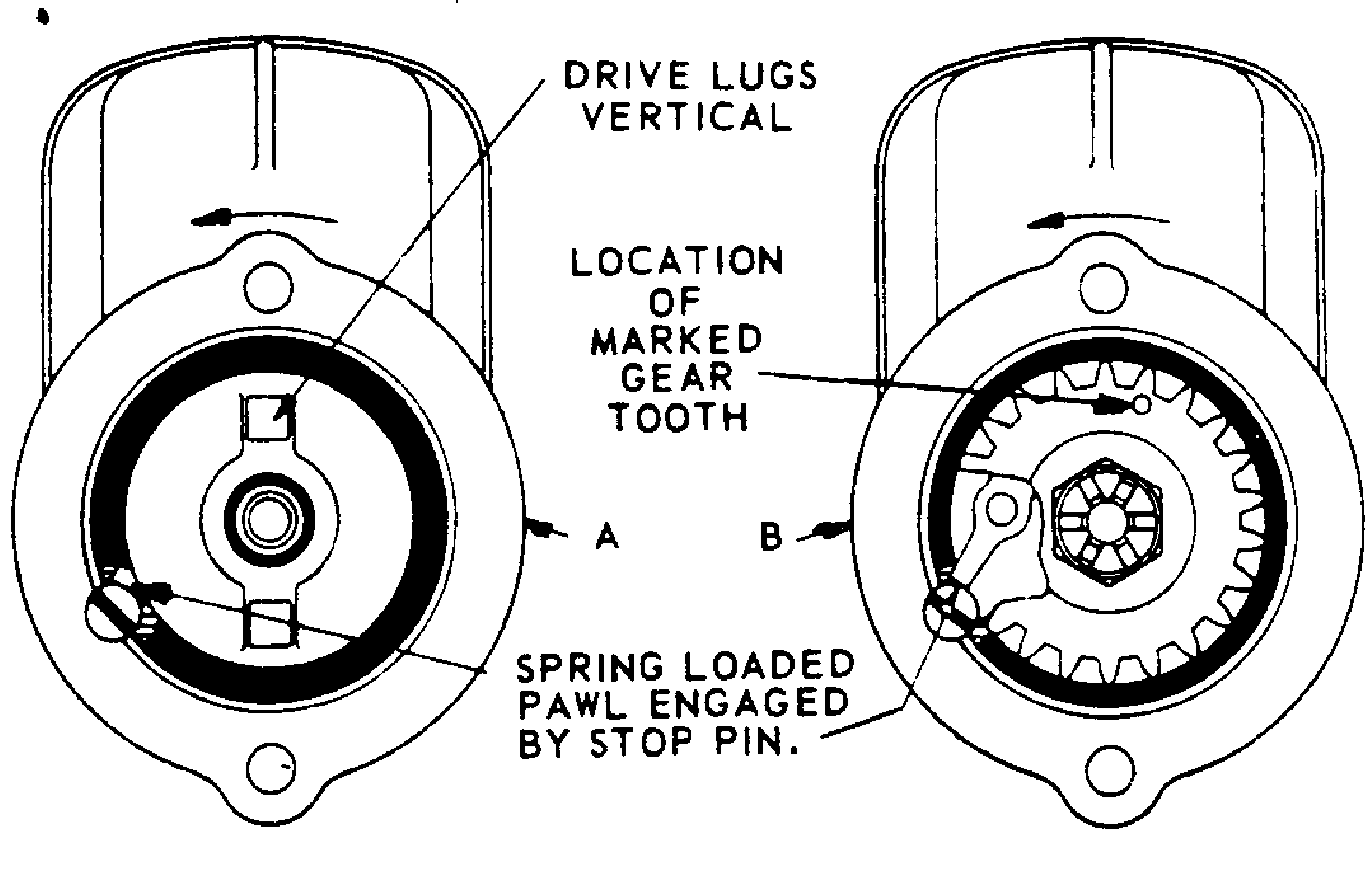

DRIVE LUGS VERTICAL
LOCATION OF MARKED GEAR TOOTH
A
B
SPRING LOADED PAWL ENGAGED BY STOP PIN.

Fig. 1, DRIVE GEAR TIMING MARK ASSEMBLY

TIMING MAGNETO TO ENGINE

Refer to **'MAGNETO TIMING'** paragraphs in front section of engine 'INSTRUCTION MANUAL' for proper mounting of magneto to crankcase, in order to obtain correct ignition timing.

LP-62 series FUEL PUMP

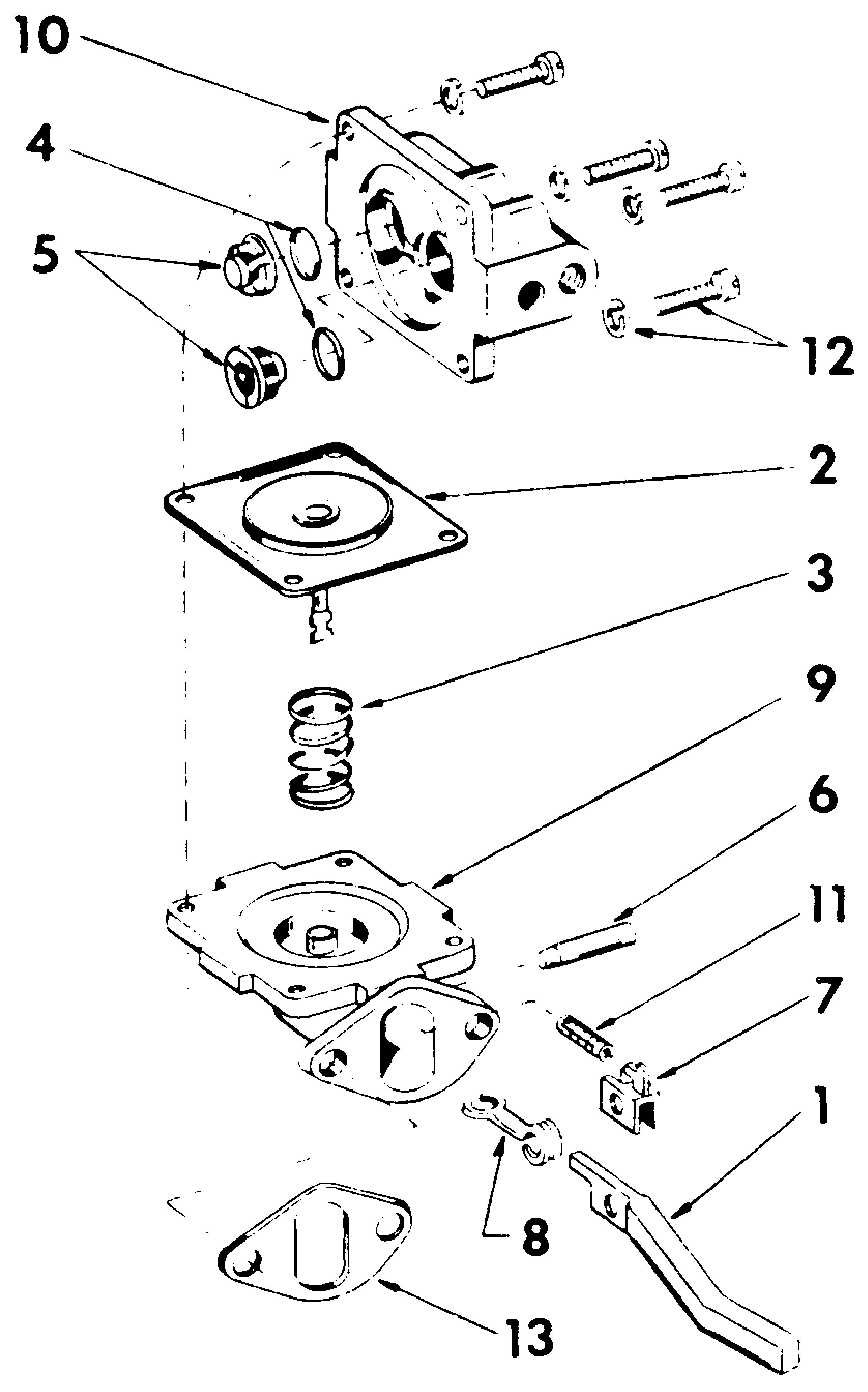
REPAIR INSTRUCTIONS

For single and two cylinder engine models

PART NO.	ENGINE USED ON
LP-62-A	THD, TJD
LP-62-B	ACN, BKN, AENL
LP-62-C	MTHD
LP-62-D	AGND
LP-62-E	S-7D
LP-62-F	S-10D, S-12D, S-14D
LP-62-G	S-8D, TRA-10D, TRA-12D

The fuel pump, like all other parts of the engine, is subject to wear and you will find that any time after 500 hours of use, its efficiency will gradually decrease. This is indictated by the engines faltering at high speeds or when heavy loads are suddenly applied. The pump can easily be restored to its normal efficiency by the installation of a **Wisconsin LQ-51** Diaphragm Kit.

1. Disconnect fuel lines from pump and remove fuel strainer if mounted to pump. Remove fuel pump from engine housing by taking out the two mounting screws.
2. File a **groove** across a point at the union of castings (9 and 10). This is a positive location of the fuel INLET and OUTLET positions when reassembling. Remove four head to bracket screws (12) and remove fuel head (10).
3. Turn fuel head (10) over, remove and discard both valve assemblies, noting their positions.
4. Clean fuel head thoroughly with kerosene or diesel fuel and a fine wire brush.



5. Hold fuel head (10), with diaphragm surface up, place two valve gaskets (4) into covities where valves were removed. Press valve assemblies (5) in **evenly** without distortion, and stake in place.
6. Set fuel head assembly aside and proceed to rebuild lower diaphragm section.
7. Insert the end of a small screw driver into the coils of rocker arm spring (11), remove and save.
8. Hold mounting bracket (9) in the left hand, with the rocker arm toward your body and the thumb nail on the end of link (8). With the heel of right hand on diaphragm (2), compress the diaphragm spring (3), and at the same time turn in a clockwise direction 90°. This will unhook the diaphragm from link (8) so it can be removed.
9. Clean the mounting bracket (9) with kerosene or diesel fuel and a fine wire brush.
10. Place the new diaphragm operating spring (3) into bracket (9). Repeat in reverse order paragraph eight, using the new diaphragm. Replace rocker arm spring (11) removed in paragraph seven.
11. Mount this assembly back on the engine in the position from which it was removed, using the new flange gasket (13), which is the last piece of the repair kit.
12. Crank the engine over to a position where the diaphragm (2) is laying flat on the mounting bracket (9). Place the fuel head (10) back in position so that the **indicating marks** of step one are **in line,** and start the four head screws approximately three turns. Again, crank the engine over to a position where diaphragm (2) is pulled down into mounting bracket (9) to its lowest position. Securely tighten the four head screws (12).
13. Mount fuel strainer to fuel pump, if applicable, and connect fuel lines.

NOTE: The **LQ-51 Diaphragm Kit** and the parts included there-in, which are identified by an asterisk (*), are the only parts of the fuel pump available for service.

Ref. No.	Description	No. Req.
1	ROCKER ARM	1
* 2	DIAPHRAGM ASSEMBLY	1
* 3	DIAPHRAGM SPRING	1
* 4	VALVE GASKETS	2
* 5	VALVE and CAGE ASSEMBLY	2
6	PIN for rocker arm	1
7	SPRING CLIP for rocker arm	1
8	LINK for diaphragm spring	1
9	MOUNTING BRACKET	1
10	FUEL HEAD	1
11	SPRING for rocker arm	1
12	SCREW and WASHER for head mounting	4
*13	GASKET for mounting flange	1

CARBURETOR

ZENITH MODEL 68-7

WISCONSIN L-63 SERIES

The Zenith 68-7 Series carburetor is of an up-draft single venturi design with a 1" S.A.E. barrel size and a 7/8" S.A.E. flange. The carburetors are made with selective fuel inlet, and with or without a main jet adjustment. These carburetors are "balanced" and "sealed", and the semi-concentric fuel bowl allows operation to quite extreme angles without flooding or starving.

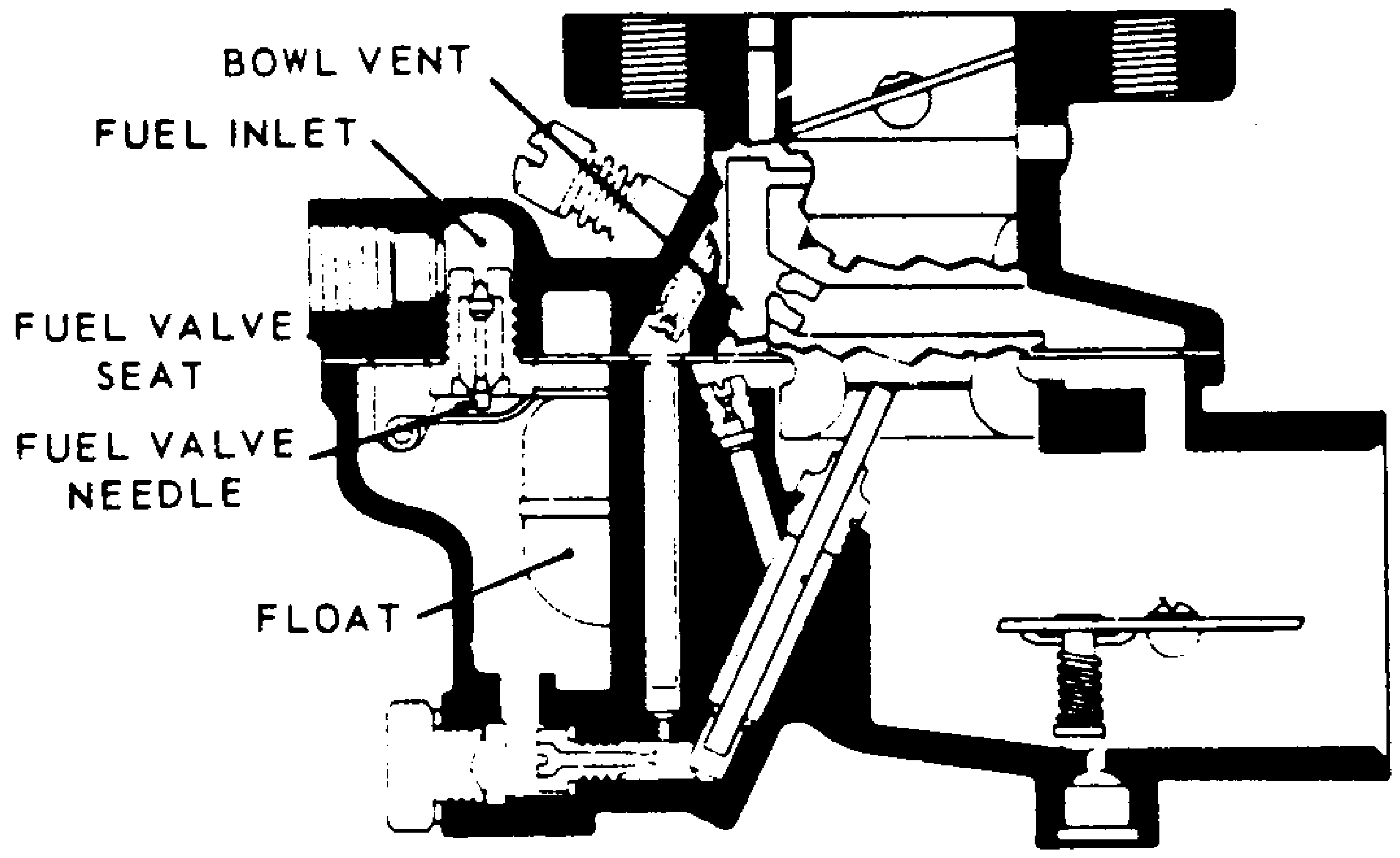


Fig. 1

Fuel supply system, Fig. 1, is made up of a threaded fuel inlet, fuel valve seat, fuel valve needle, float and fuel bowl. Fuel travels through the fuel valve seat and passes around the fuel valve and into the fuel bowl. The level of the fuel in the fuel chamber is regulated by the float through its control of the fuel valve. The fuel valve does not open and close alternately but assumes an opening, regulated by the float, sufficient to maintain a proper level in the fuel chamber equal to the demand of the engine according to its speed and load.

The inside bowl vent as illustrated by the passage originating in the air intake and continuing through to the fuel bowl, is a method of venting the fuel bowl to maintain proper air fuel mixtures even though the air cleaner may become restricted. This balancing is frequently referred to as an "inside bowl vent".

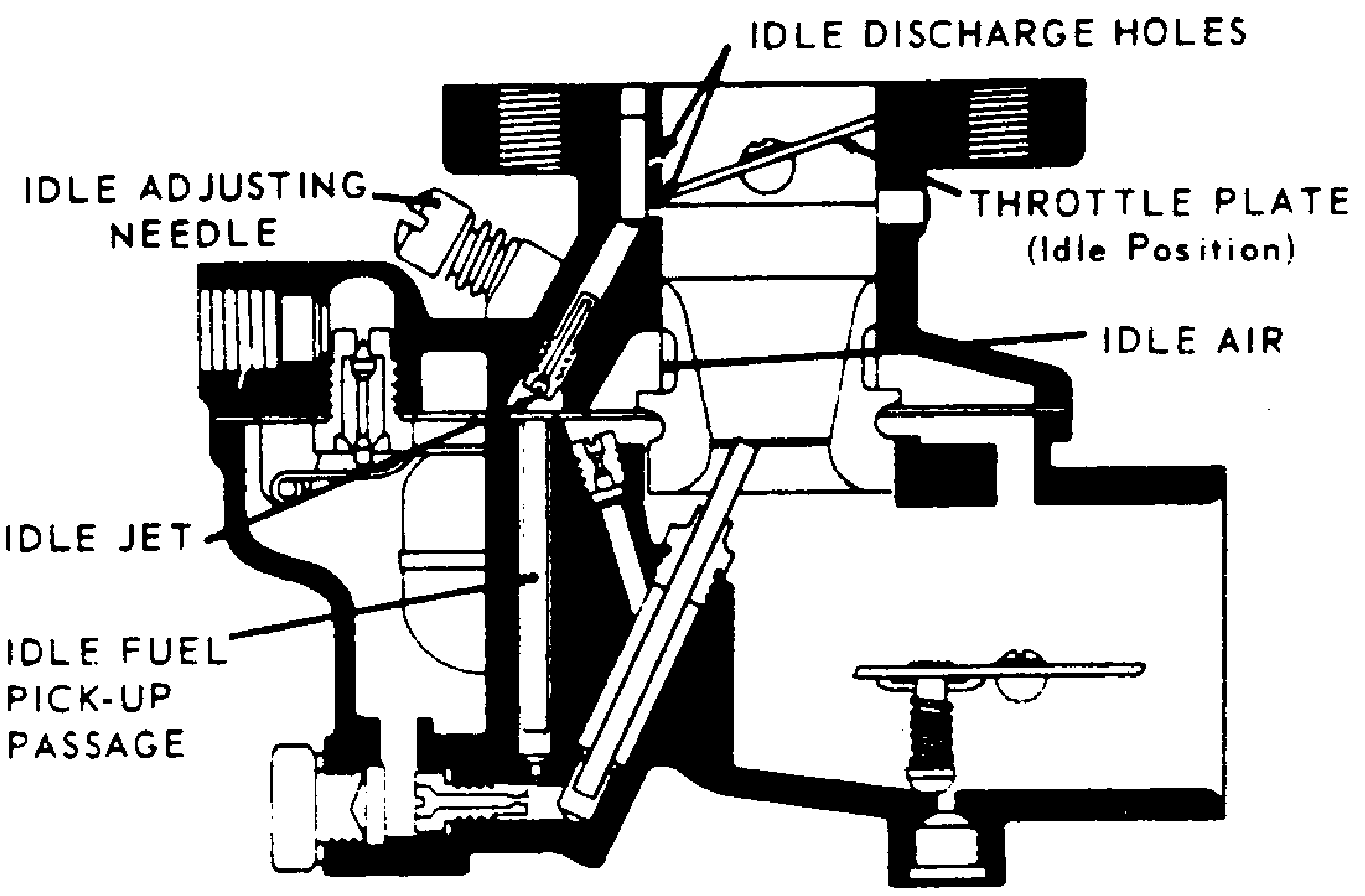


Fig. 2

Idle system, Fig. 2, consists of two idle discharge holes, idle air passage, idle adjusting needle, idle jet, and fuel pick-up passage. The fuel for idle is supplied through the main jet to a well directly below the main discharge jet. The pick-up passage is connected to this well by a restricted drilling at the bottom of this passage. The fuel travels through this channel to the idle jet calibration. The air for the idle mixture originates back of (or from behind) the main venturi. The position of the idle adjusting needle in this passage controls the suction on the idle jet and thereby the idle mixture. Turning the needle in closer to its seat results in a greater suction with a smaller amount of air and therefore a richer mixture. Turning the needle out away from its seat increases the amount of air and reduces the suction, and a leaner mixture is delivered. The fuel is atomized and mixed with the air in the passage leading to the discharge holes and enters the air stream at this point.

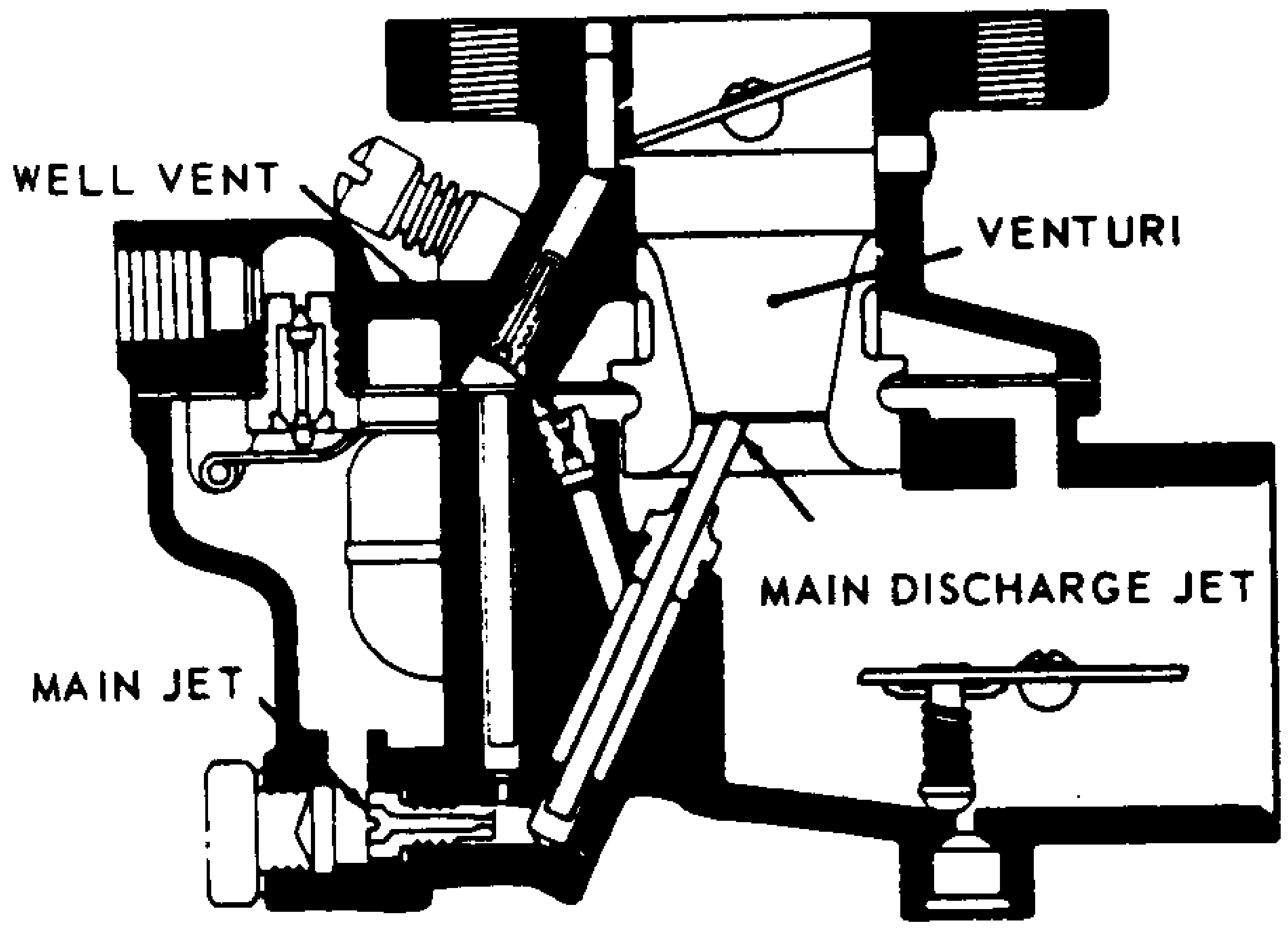


Fig. 3

High speed system, Fig. 3, controls the fuel mixture at part throttle speeds and at wide open throttle. This system consists of a **venturi**, controlling the maximum volume of air admitted into the engine, the **main jet**, which regulates the flow of fuel from the float chamber to the main discharge jet; the **well vent**, which maintains uniform mixture ratio under changing suction and engine speeds; and a **main discharge jet**, which delivers the fuel into the air stream.

The main jet controls the fuel delivery during part throttle range from about one-quarter to full throttle opening. To maintain a proper mixture, a small amount of air is admitted through the well vent into the discharge jet through air bleed holes in the discharge jet at a point below the level of fuel in the metering well.

The passage of fuel through the high speed system is not a complicated process. The fuel flows from the fuel chamber through the main jet and into the main discharge jet where it is mixed with air admitted by the well vent, and the air-fuel mixture is then discharged into the air stream of the carburetor.

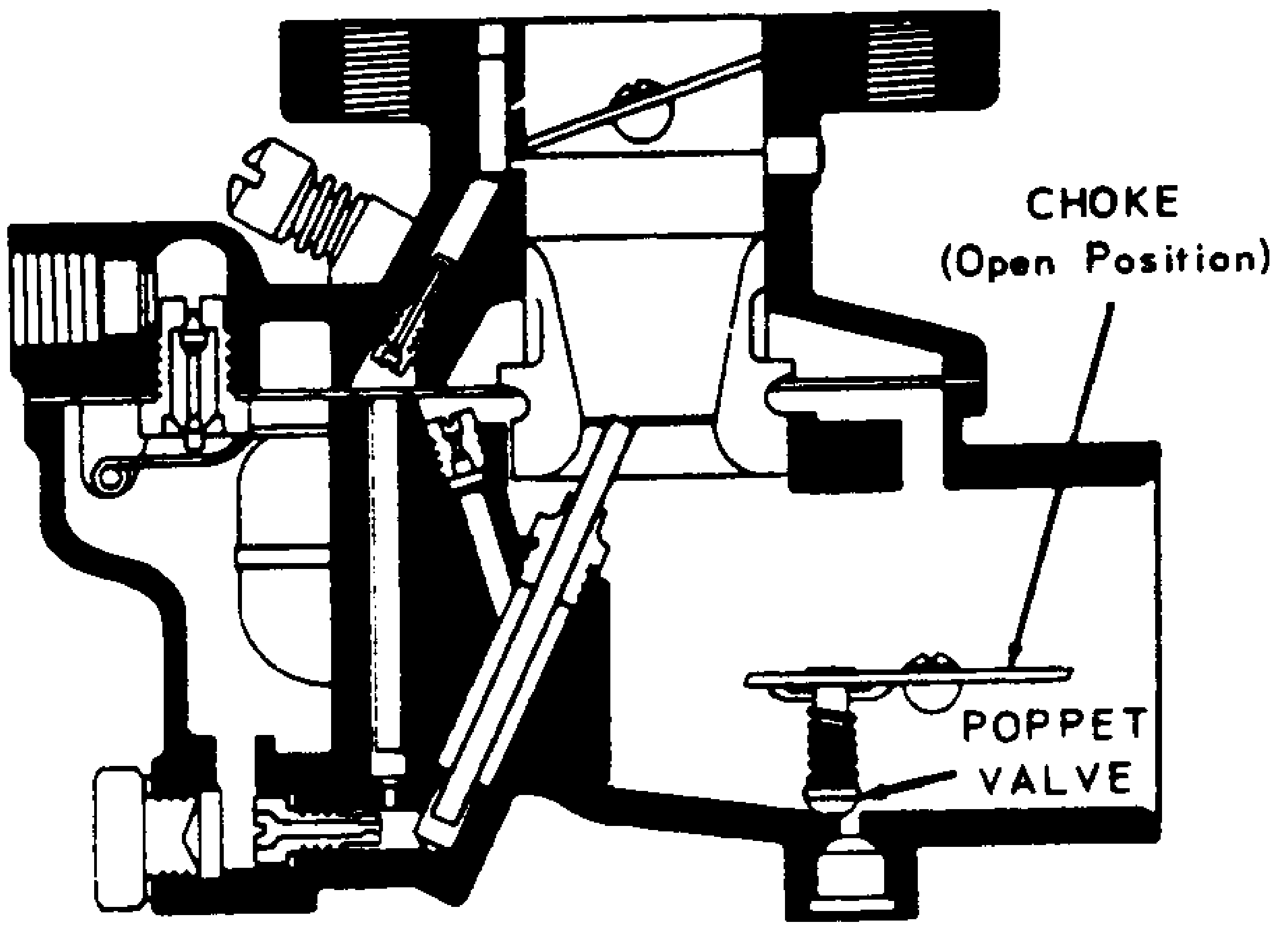


Fig. 4

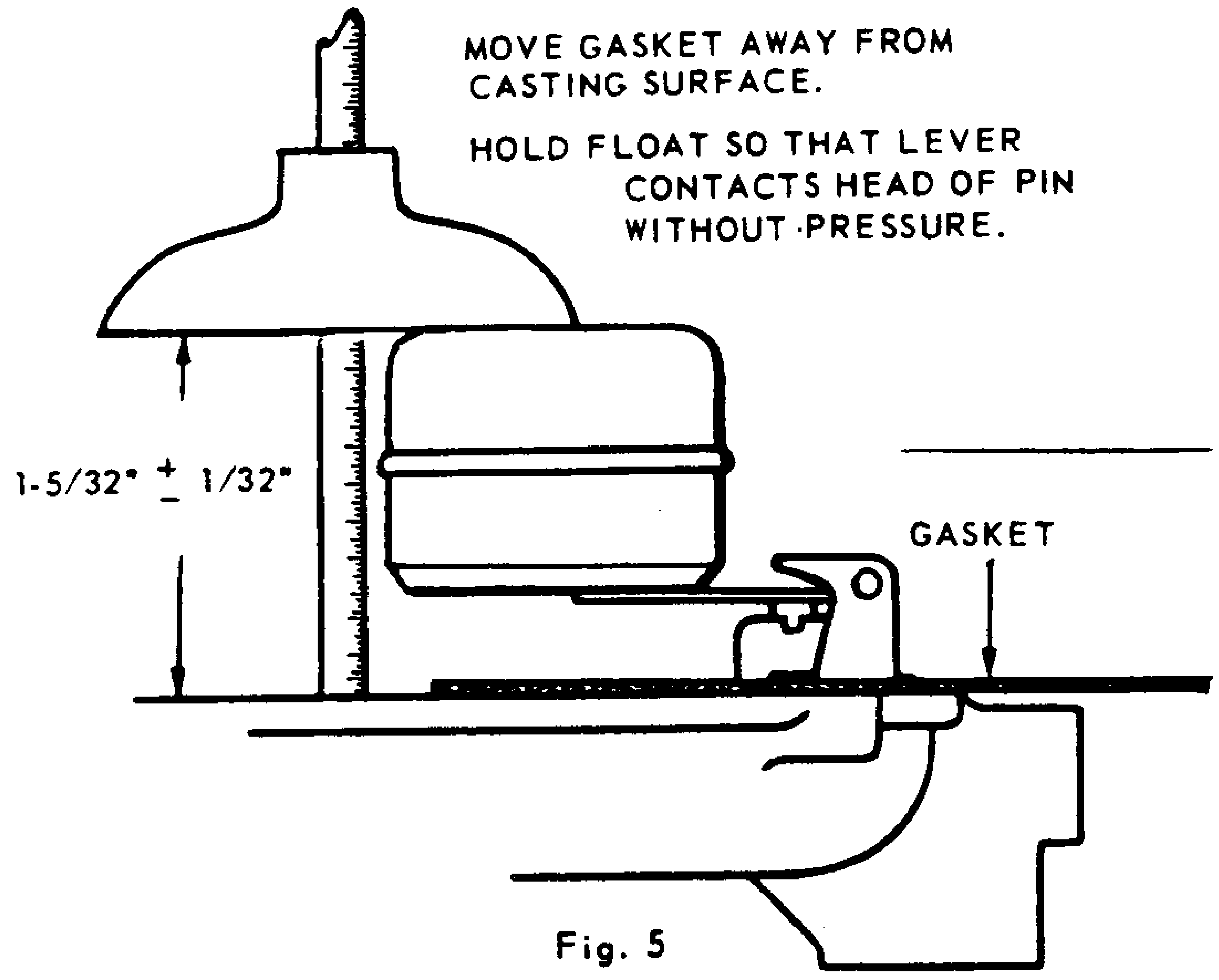
Choke system, Fig. 4, consists of a valve mounted on a shaft located in the air entrance and operated externally by a lever mounted on the shaft. The choke valve is used to restrict the air entering the carburetor. This increases the suction on the jets when starting the engine. The choke valve is of a "semi-automatic" type, having a poppet valve incorporated in its design, which is controlled by a spring. The poppet valve opens automatically when the engine starts and admits air to avoid over-choking or flooding of the engine. The mixture required for starting is considerably richer than that needed to develop power at normal temperatures. As the engine fires and speed and suction are increased, the mixture ratio must be rapidly reduced. This change is accomplished through adjustment of the choke valve and the automatic opening of the poppet valve to admit more air when the engine fires.

FLOAT SETTING, Fig. 5

If float position is not to the dimension shown, use a long nose pliers and bend lever close to float body, to obtain correct float setting.

FUEL LEVEL

The liquid level in float chamber is 17/32 to 19/32 inch below top of float bowl. This level was established with a #35 fuel valve seat at 1½ p.s.i. and a sight tube approximately 1/4 to 9/32 inch i.d.

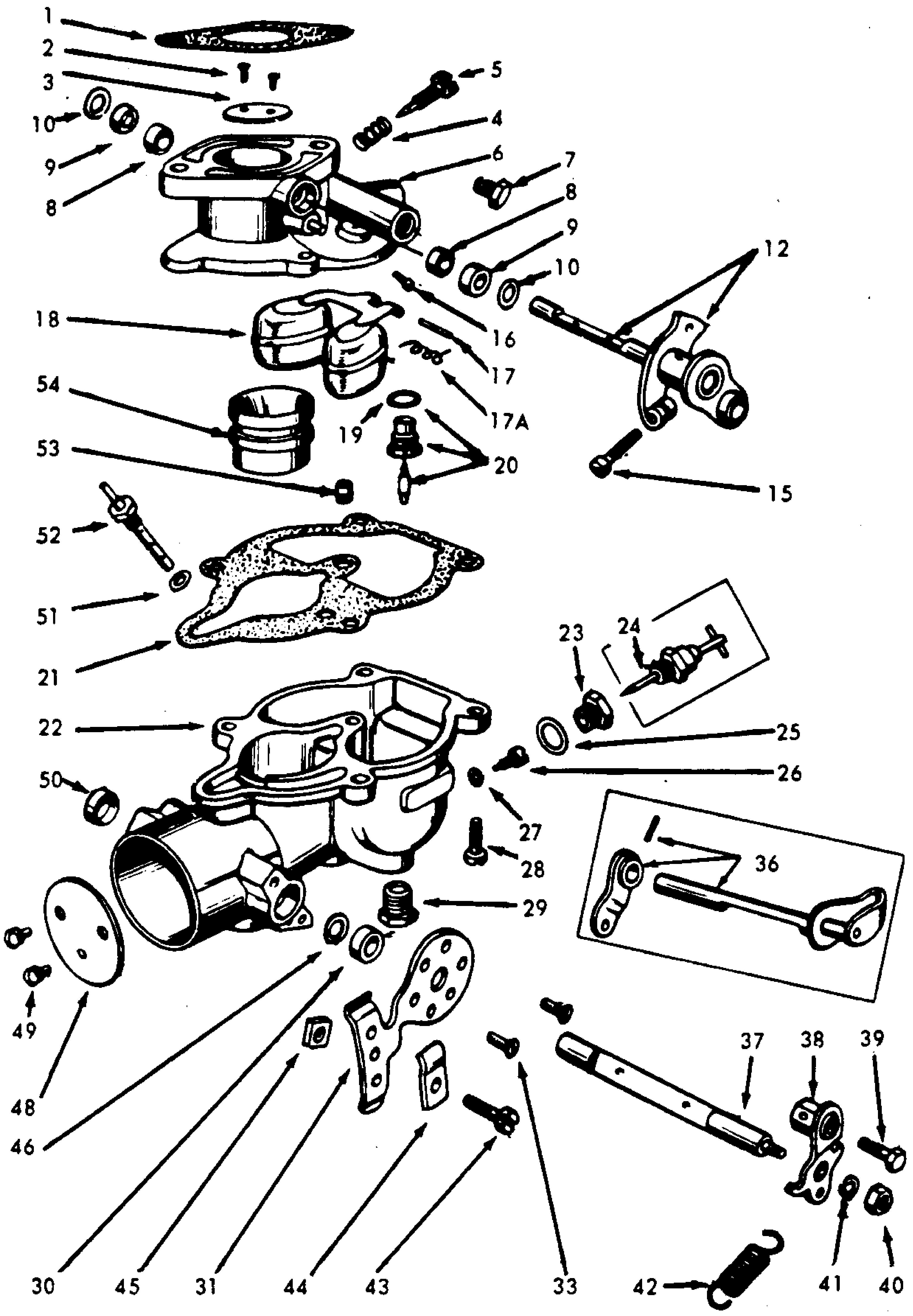

MOVE GASKET AWAY FROM CASTING SURFACE.

HOLD FLOAT SO THAT LEVER CONTACTS HEAD OF PIN WITHOUT PRESSURE.

Fig. 5

SERVICE PARTS LIST

Parts are identified by reference number. See parts list for correct part number.



CARB. REF.	ZENITH NO.	WISCONSIN NO.
1	12098A ●	L-63
2	12188G ●	L-63-A
3	12158D ●	L-63-C
4	12325	L-63-D
5	12199E ●	L-63-E
6	12205A ●	L-63-F
7	12235E ●	L-63-G
8	12236	L-63-H
9	12239C ●	L-63-J
10	12234F ●	L-63-K
11	12288C ●	L-63-L
12	12300	L-63-M
13	12599D ●	L-63-N
14	12375D ●	L-63-R
15	12448D ●	L-63-U
16	12449D ●	L-63-V
17	12545C ●	L-63-W
18	12543C ●	L-63-Y
19	12546	L-63-Z
20	12647	L-63-AA
21	12253A ●	LZ-63-2
22	12229D ●	LZ-63-C
23	12238D ●	LZ-63C-2
24	12744B ●	L-63-AF
25	12982B ●	L-63-AN
26	13201A ●	L-63-AP
27	13238A ●	L-63-AQ
28	13405A ●	L-63-AV
29	13420A ●	L-63-BC
30	13449A ●	L-63-BD
31	13694	L-63-BL

NOTE: Beginning with this letter designation ●, bushings (Ref. 8) were discontinued.

CARBURETOR PARTS LIST

ZENITH MODEL 68-7 WISCONSIN L-63 Series

Item No.	Part Number	Description	No. Req.
1	QC-71-A *	**GASKET** – flange, (Zenith No. C141-4-5)	1
2	93-T315S5-4	**SCREW & WASHER** – throttle plate	2
	93-T315B5-4	**SCREW & WASHER** – throttle plate, for 30	2
3	93-C21-176	**PLATE** – throttle, for all except 5, 7, 8, 10, 12, 14, 18	1
	93-C21-205	**PLATE** – throttle, for 5, 7, 8, 10, 12, 14, 18	1
4	93-C111-17	**SPRING** – idle needle	1
5	93-C46-6 *	**NEEDLE** – idle adjusting	1
6		**BODY** – throttle, (Not available for service)	
7	93-T91-3	**1/8" PLUG** – fuel inlet R.H.	1
8	93-C9-75	**BUSHING** – throttle shaft **(See Note)**.............	2
9	93-T48-9 *	**SEAL** – throttle shaft	2
10	93-T52-57 *	**RETAINER** – shaft seal (1 used for 28)	2
	93-C131-38	**CUP PLUG,** for 28	1
12	93-C29-491	**SHAFT & STOP LEVER** – throttle, for 1, 3, 6, 9, 11, 17, 19, 20, 21, 22, 23, 29, 31	1
	93-C29-1301	**SHAFT & STOP LEVER** – throttle, for 4	1
	93-C29-926	**SHAFT & STOP LEVER** – throttle, for 5, 7, 8, 10, 14, 18	1
	93-C29-1418	**SHAFT & STOP LEVER** – throttle, for 25, 27	1
	93-C29-1476	**SHAFT & STOP LEVER** –throttle, for 15, 16, 30	1
	93-C29-858	**SHAFT & STOP LEVER** – throttle, for 2, 13, 24	1
	93-C29-1475	**SHAFT & STOP LEVER** – throttle, for 12	1
	93-C29-1584	**SHAFT & STOP LEVER** – throttle, for 26	1
	93-C29-1607	**SHAFT & STOP LEVER** – throttle, for 28	1
15	93-T8S8-12-NP	**SCREW – THROTTLE STOP,** for all except 25, 27, 30	1
	93-T8S8-10-NP	**SCREW – THROTTLE STOP,** for 25, 27, 30	1
16	93-C55-6-12	**JET – IDLE,** for all except 25, 27, 29, 30......	1
	93-C55-6-10	**JET – IDLE,** for 29, 30	1
	93-C55-22-11	**JET – IDLE,** for 25, 27	1
17	93-C120-4 *	**AXLE – FLOAT**	1
17A	93-C117-79	**SPRING – FLOAT,** for all except 1,6,16,21,28	1
18	93-C85-103	**FLOAT and HINGE ASSEMBLY**	1
19	93-T56-20 †*	**WASHER** (.040" thick fiber) for 93-C81-17 .... **Solid type** fuel valve and seat.	1
	93-T56-70 †*	**WASHER** (.020" thick fiber) for 93-C81-50 .... **Spring type** fuel valve and seat.	1
20	93-C81-17-35*	**VALVE & SEAT,** fuel **(solid type)** for 1, 4, 5, 6, 8, 10, 13, 16, 21, 25, 27, 28, 29, 30, 31 ...	1
	93-C81-17-25*	For 18 and 20	1
	93-C81-50-35*	**VALVE & SEAT.** fuel **(spring type)** for 2, 3, 7, 9, 11, 12, 14, 15, 22, 23, 24, 26	1
	93-C81-50-25*	For 17 and 19	1
21	93-C142-74 †*	**GASKET – BOWL TO BODY**	1
22	93-B3-121B-1	**BOWL – FUEL,** for 1, 6, 20, 21	1
	93-B3-121A-3	**BOWL – FUEL,** for 2, 5, 10, 12, 18	1
	93-B3-121A-1	**BOWL – FUEL,** for 3, 7, 8, 9, 11, 14, 17, 19, 22, 24, 29, 31	1
	93-B3-121B-2	**BOWL – FUEL,** for 4	1
	93-B3-121A-2	**BOWL – FUEL,** for 13	1
	93-B3-121E-1	**BOWL – FUEL,** for 15, 23, 30	1
	93-B3-121F-1	**BOWL – FUEL,** for 16	1
	93-B3-121D-6	**BOWL – FUEL,** for 25	1
	93-B3-121A-7	**BOWL – FUEL,** for 26	1
	93-B3-121A-8	**BOWL – FUEL,** for 27	1
	93-B3-121B-3	**BOWL – FUEL,** for 28	1
23	93-C138-24	**PLUG – MAIN JET PASSAGE,** for 1, 3, 4, 8, 10, 15, 16, 19, 20, 21, 22, 23, 24, 26, 28, 29, 30, 31	1
24	93-C71-21	**ADJUSTMENT – MAIN JET,** for 2, 5, 6, 7, 9, 11, 12, 13, 14, 17, 18, 25, 27	1
25	93-T56-23 †*	**WASHER (fiber) – PLUG & ADJUSTMENT** ..	1
26	93-C52-7-22	**JET – MAIN,** for 1, 4, 16, 20, 21, 28, 29, 30	1
	93-C52-7-33	**JET – MAIN,** for 2, 13, 25, 27	1
	93-C52-7-26	**JET – MAIN,** for 5, 7, 11, 12, 14, 17, 18	1
	93-C52-7-25	**JET – MAIN,** for 6	1
	93-C52-7-19	**JET – MAIN,** for 8	1
	93-C52-7-30	**JET – MAIN,** for 9	1
	93-C52-7-21	**JET – MAIN,** for 10	1
	93-C52-7-23	**JET – MAIN,** for 3, 15, 19, 22, 23, 24, 26	1
	93-C52-7-24	**JET – MAIN,** for 31	1
27	93-T56-24 †*	**WASHER (fiber) – MAIN JET**	1
28	93-T301S10-10	**SCREWS – BOWL TO BODY ASSEMBLY**	4
29	93-T91-3	**PLUG – BOWL DPAIN**	1
30	93-C131-4X2 *	**RETAINER – CHOKE SHAFT SEAL,** for 1 thru 25, 27, 29, 30, 31	1
	93-T52-53 *	**RETAINER – CHOKE SHAFT SEAL,** for 26, 28	1
31	93-C109-60C	**BRACKET – CHOKE,** for 1, 3, 6, 7, 8, 9, 11, 14, 15, 16, 17, 19, 20, 21, 23, 24, 26, 29, 30, 31	1
	93-C109-60C-2	**BRACKET – CHOKE,** for 4, 13, 27	1
	93-C109-60C-1	**BRACKET – CHOKE,** for 22	1
	93-C109-60E-1	**BRACKET – CHOKE,** for 28	1
33	93-C140-58	**SCREWS – CHOKE BRACKET ASSEMBLY** .. For all except 2, 5, 10, 12, 18, 25.	2
36	93-C108-280	**SHAFT & FRICTION LEVER – CHOKE,** for 2	1
	93-C108-279	**SHAFT & FRICTION LEVER – CHOKE,** for 5, 10, 12, 18	1
	93-C108-277	**SHAFT & FRICTION LEVER – CHOKE,** for 25	1
37	93-C105-286	**SHAFT – CHOKE,** for all except 2, 5, 10, 12, 18, 25	1
38	93-C106-2	**LEVER – CHOKE,** for all except 2, 5, 10, 12, 18, 25	1
39	93-T8S8-7	**SCREW – CHOKE LEVER SWIVEL,** for all except 2, 5, 10, 12, 18, 25	1
40	93-T22S8	**NUT – CHOKE SHAFT,** for all except 2, 5, 10, 12, 18, 25	1

(Continued)

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

CARBURETOR PARTS LIST

ZENITH MODEL 68-7

WISCONSIN L-63 Series

Item No.	Part Number	Description	No. Req.
41	93-T41-10	**LOCKWASHER – CHOKE SHAFT NUT,** for all except 2, 5, 10, 12, 18, 25	1
42	93-C112-6	**SPRING – CHOKE LEVER RETURN,** for all except 2, 5, 10, 12, 18, 25	1
43	93-T8S8-8	**SCREW – BRACKET CLIP,** for all except 2, 5, 10, 12, 18, 25	1
44	93-C110-7	**CLIP – BRACKET TUBE,** for all except 2, 5, 10, 12, 18, 25	1
45	93-T21S8	**NUT – CLAMP SCREW,** for all except 2, 5, 10, 12, 18, 25	1
46	93-T57-4 *	**SEAL – CHOKE SHAFT,** for all except 26, 28	1
	93-T48-9 *	**SEAL – CHOKE SHAFT,** for 26, 28	1
48	93-C101-80	**PLATE – CHOKE,** for all except 2,13,25,27	1
	93-C101-85	**PLATE – CHOKE,** for 2, 13, 25, 27	1
49	93-T315S5-4	**SCREW & WASHER CHOKE PLATE,** for all except 30	2
	93-T315B5-4	**SCREW & WASHER CHOKE PLATE,** for 30	2
50	93-CR37-1X1 *	**PLUG – CHOKE SHAFT HOLE,** for all except 2, 5, 10, 12, 18	1
51	93-T56-48 †*	**WASHER (fiber) – DISCHARGE JET**	1
52	93-C66-114-60	**JET – DISCHARGE,** for 1, 4, 6, 16, 20, 21, 28	1
	93-C66-114-45	**JET – DISCHARGE,** for 2, 13, 25, 27	1
	93-C66-114-50	**JET – DISCHARGE,** for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26, 29, 30, 31	1
	93-C66-114-40	**JET – DISCHARGE,** for 5, 7, 8, 10, 12, 14, 18	1
53	93-C77-18-12	**JET – WELL VENT,** for 1, 4, 6, 16, 20, 21, 28	1
	93-C77-18-13	**JET – WELL VENT,** for 2, 13, 25, 27	1
	93-C77-18-22	**JET – WELL VENT,** for 3, 9, 11, 15, 17, 19, 22, 23, 24, 26, 29, 30, 31	1
	93-C77-18-17	**JET – WELL VENT,** for 5, 7, 8, 10, 12, 14, 18	1
54	93-B38-74-18	**VENTURI,** for 1, 3, 4, 6, 9, 11, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 28	1
	93-B38-74-19	**VENTURI,** for 2, 13, 25, 27, 29, 30, 31	1
	93-B38-74-17	**VENTURI,** for 5, 7, 8, 10, 12, 14, 18	1
Not Illust.	93-C2454AD1X2	**LEVER – THROTTLE CLAMP,** for 15,16,30	1
	93-T8B10-9	**SCREW – LEVER CLAMP,** for 15, 16, 30	1
	93-T8B8-10	**SCREW – LEVER SWIVEL,** for 15, 16, 30	1
–	93-C181-329	**GASKET KIT**	1
–	LQ-33	**REPAIR PARTS KIT** (with **spring type** fuel valve and seat) for 2, 3, 7, 9, 11, 12, 14, 15, 22, 23, 24, 26	1
–	LQ-39	**REPAIR PARTS KIT** (with **solid type** fuel valve and seat) for 1, 4, 5, 6, 8, 10, 13, 16, 21, 25, 27, 28, 29, 30, 31	1
–	93-K-2130	**REPAIR PARTS KIT,** for 17, 19	1
–	93/K-**	**REPAIR PARTS KIT,** for 18, 20	1

* **Parts in Repair Kit**

† **Parts in Gasket Set**

** **Specify Zenith Carburetor Number**

Order parts from nearest ***WISCONSIN DISTRIBUTOR*** or ***SERVICE CENTER.***

IMPORTANT: Always give Model, Specification and Serial Numbers as shown on name plate.

MARVEL-SCHEBLER TSX CARBURETOR

L-64 Series

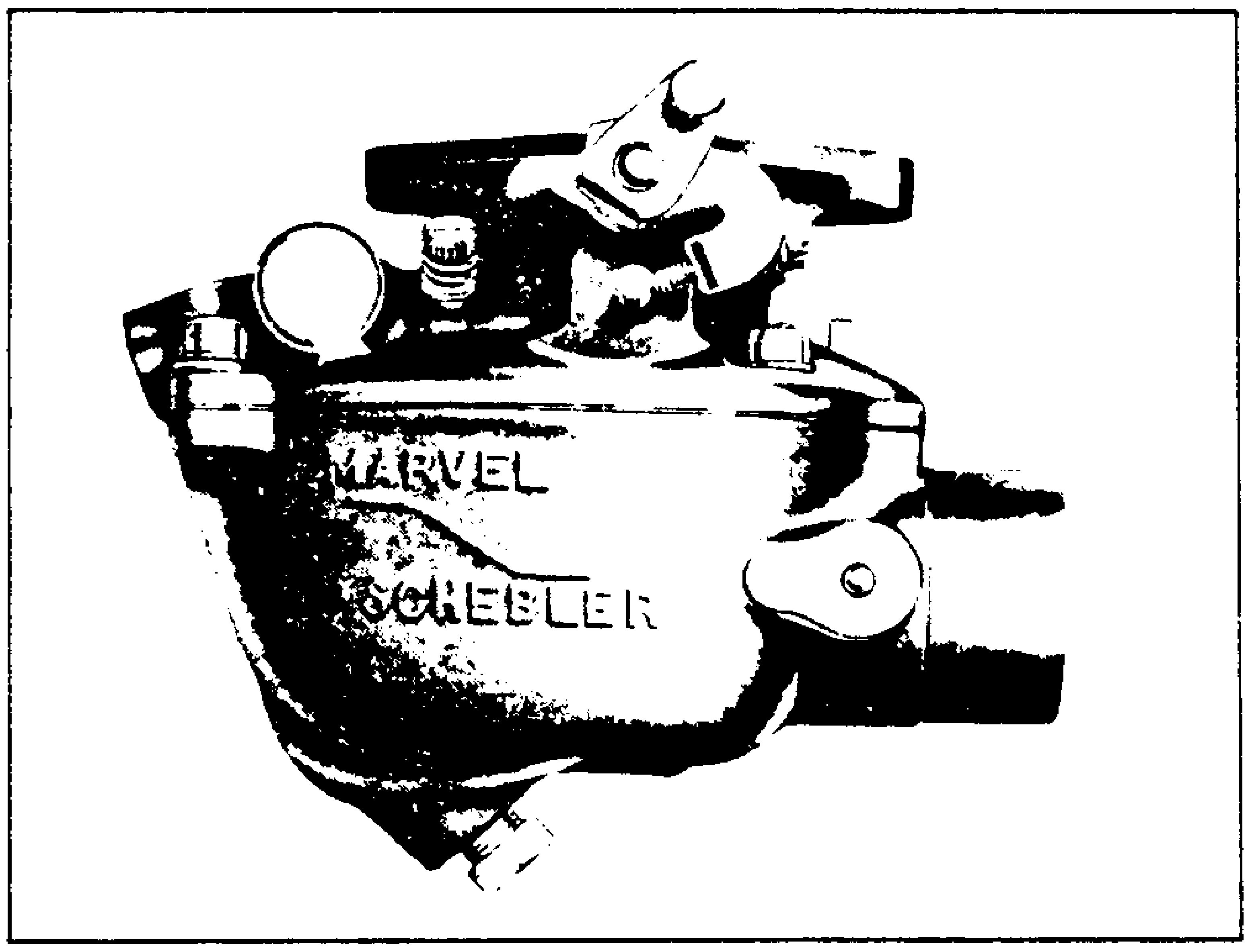


Fig. 1 76941C

FIXED JET CARBURETER

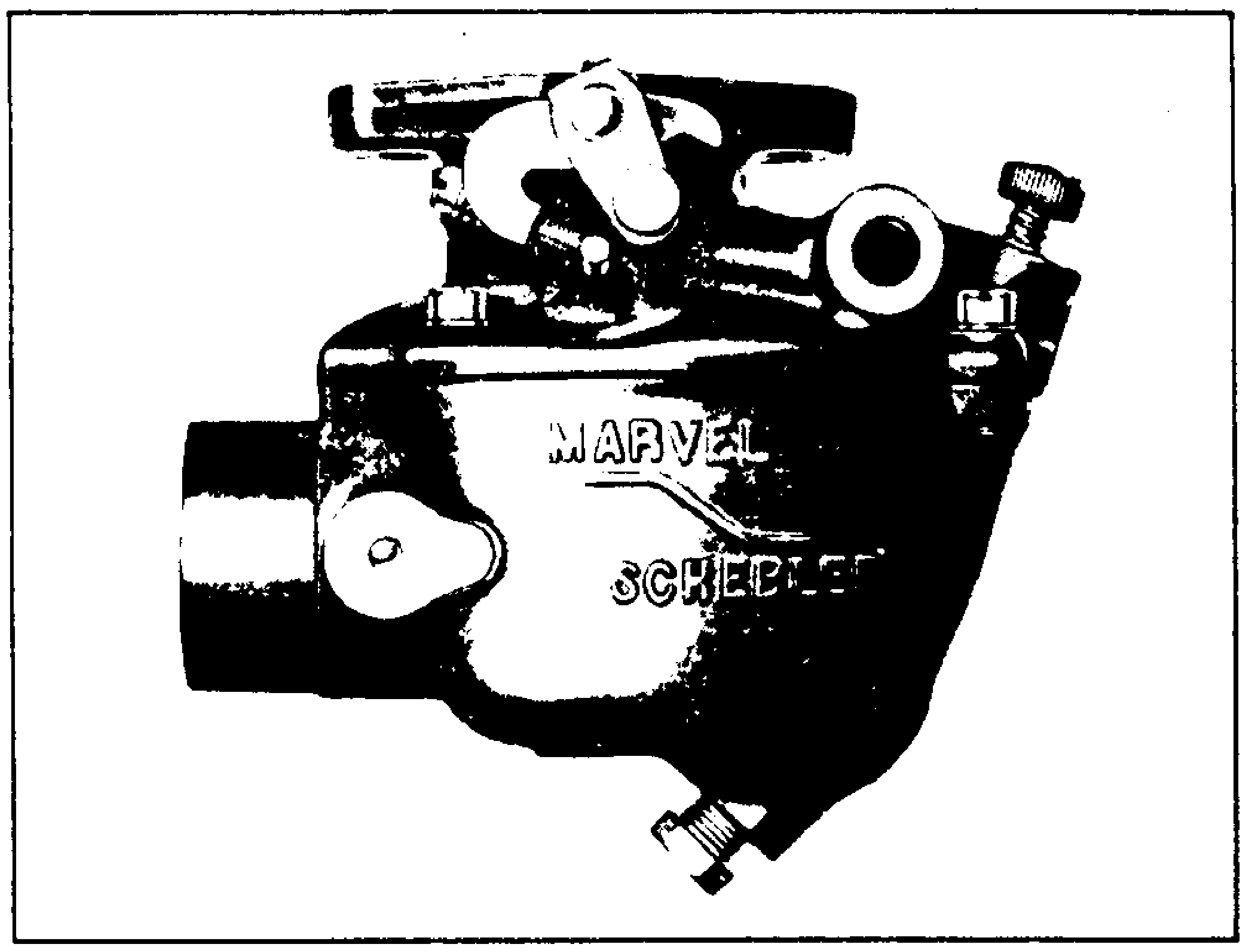


Fig. 2 78863C

ADJUSTABLE JET CARBURETER

DESCRIPTION

Fig. 1, Marvel-Schebler No. TSX-690 Carburetor. Wisconsin Motor Part Number L-64, for engine Model VH4D.

Fig. 1, Marvel-Schebler No. TSX-954 Carburetor. Wisconsin Motor Part No. L-64-F, for engine Model TJD.

Fig. 2, Marvel-Schebler No. TSX-770 and TSX-676. Wisconsin Motor Part Number L-64A, for engine Model AGND.

PRELIMINARY ADJUSTMENTS

Set *throttle stop screw* so that throttle fly is open slightly. Make certain that gasoline supply to carburetor is open. Set throttle control lever to one-third open position. Close choker fly by means of choke control button or choke lever on carburetor. Adjust *idle needle*, as described in "Low Speed Adjustment" paragraph. Start engine and partially release choke. After the engine has been run sufficiently to bring it up to operating temperature throughout, see that choke is returned to wide open position.

LOW SPEED ADJUSTMENT

The *idle needle* on these carburetors should be set between 1 to 1-1/4 turns off of the seat. Care should be used when seating the idle needle so as not to score the point of the needle, by turning too tight.

Set throttle or governor control lever in slow idle position and adjust *throttle stop screw* for the correct engine idle speed. (On a new, stiff engine this speed must be slightly higher than required for a thoroughly run-in engine.) Turn *idle adjusting needle* in, or clockwise, until engine begins to falter or roll from richness, then turn *idle adjusting needle* out, or counter-clockwise, until the engine runs smoothly.

Note: It is better that this adjustment be slightly too rich than too lean.

HIGH SPEED ADJUSTMENT

On adjustable jet carburetor, as illustrated in Fig. 2, the *high speed adjusting needle* should be set 1-5/8 turns off of the seat, plus or minus a ½ turn.

With the engine running at governed speed under load, turn the *adjusting needle* in, or clockwise, a little at a time until the power drops appreciably. Then turn needle out, or counter-clockwise, until the engine picks up power and runs smoothly. This will give an economical part throttle mixture, and, due to the econimizer action, the proper power mixture for full throttle operation. If, in trying out the engine, it is inclined to backfire when the load is picked up, richen the mixture by backing out the adjustment needle a little at a time until good acceleration is obtained.

FLOAT SETTING

The float should be set so that with the throttle body in an inverted position, the float is ¼" from the throttle body to bowl gasket, keeping the edges of the float parallel with this gasket.

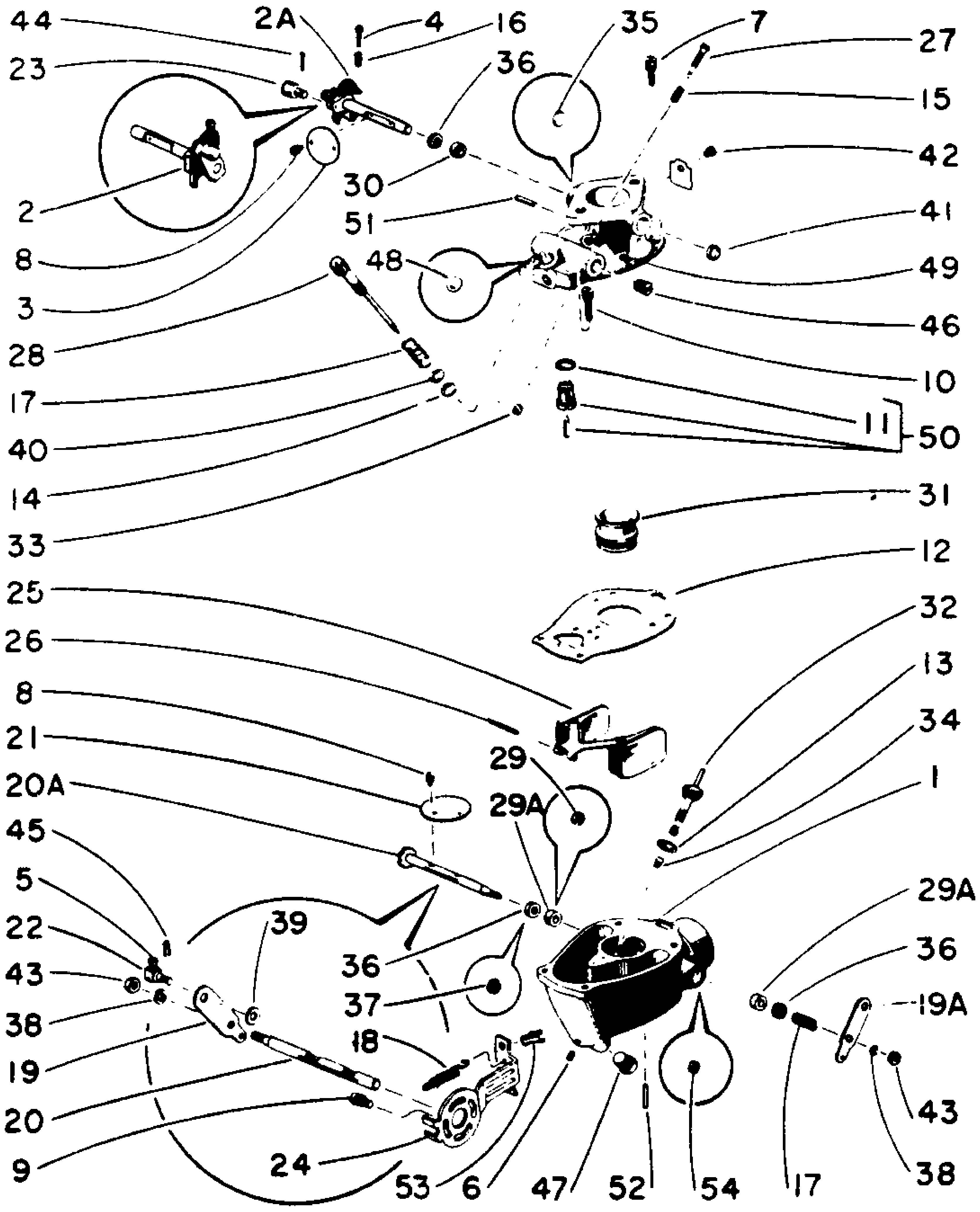
MARVEL-SCHEBLER CARBURETOR DIVISION, BORG-WARNER CORPORATION

DECATUR, ILL., U. S. A.

MARVEL–SCHEBLER TSX CARBURETORS

WISCONSIN PART No.	MARVEL-SCHEBLER No.
L-64	TSX-690
L-64-A	TSX-770 and TSX-676
L-64-F	TSX-954 (10-5030)

NOTE: ALL PARTS INTERCHANGEABLE, EXCEPT WHERE NOTED BY MODEL No.



Ref. No.	Part Number	Description	No. Req.
1	46-10-4101	**BOWL BODY ASSEMBLY** (L-64)	1
	46-10-4259	**BOWL BODY ASSEMBLY** (L-64-A)	1
	46-10-5058	**BOWL BODY ASSEMBLY** (L-64-F)	1
2	46-13-1246	**THROTTLE SHAFT** and **LEVER ASSEMBLY** (L-64, L-64-F)	1
2A	46-13-1202	**THROTTLE SHAFT** and **LEVER ASSEMBLY** (L-64-A)	1
3	46-14-169	**THROTTLE FLY** (20°)	1
4	46-15-118	**SCREW,** No. 8-32 x 5/8 Fillister head, throttle stop(L-64, L-64-F)	1
	46-15-42	**SCREW,** No. 8-32 x 3/4 Fillister head, throttle stop (L-64-A)	1
5	46-15-285	**SCREW,** No. 8-32 x 5/16 Fillister head, choke swivel (L-64, L-64-F)	1
6	46-15-409	**SCREW,** No. 8-32 drill plug, for nozzle hole	1
7	46-15-A82	**SCREW,** No. 12-24 x 5/8 Fillister head, throttle body to bowl	3
8	46-15-A91	**SCREW,** No. 4-40 x 1/4 bind head, Sems 2-for choke fly 2-for throttle fly	4
9	46-15-A93	**SCREW,** No. 8-32 x 3/8 Fillister head, choke bracket (L-64, L-64-F)	1
10	46-15-A206	**SCREW,** No. 12-24 x 1-1/8 Fillister head, throttle body to bowl	1
11	46-16-4	**GASKET,** float valve seat	1
12	46-16-80	**GASKET,** throttle body to bowl	1
13	46-16-449	**GASKET,** main nozzle (L-64, L-64-A)	1
	46-16-28	**GASKET,** main nozzle (L-64-F)	1
14	46-16-491	**GASKET,** high speed needle (L-64-A)	1
15	46-24-340	**SPRING,** idle needle	1
16	46-24-485	**SPRING,** throttle stop screw (L-64)	1
	46-24-262	**SPRING,** throttle stop screw (L-64-A)	1
	46-24-285	**SPRING,** throttle stop screw (L-64-F)	1
	46-24-A332	**SPRING,** float support (L-64-F) Not illustrated	1
17	PM-214	**SPRING** (L-64-A) 1-for high speed needle 1-for choke lever	2
18	46-24-A324	**SPRING,** choke return (L-64, L-64-F)	1
19	46-25-661	**CHOKE LEVER ASSEMBLY** (L-64, L-64-F)	1
19A	46-25-322	**CHOKE LEVER** (L-64-A)	1
20	46-26-357	**CHOKE SHAFT** (L-64, L-64-F)	1
20A	46-26-847	**CHOKE SHAFT** and **HEAD ASSY.** (L-64-A)	1
21	46-27-254	**CHOKE FLY** (L-64)	1
	46-27-587	**CHOKE FLY** (L-64-A)	1
	46-27-580	**CHOKE FLY** (L-64-F)	1
22	46-28-49	**SWIVEL,** choke lever (L-64, L-64-F)	1
23	46-28-94	**SWIVEL,** throttle lever	1
24	46-29-557	**CHOKE BRACKET ASSY.** (L-64, L-64-F)	1
25	46-30-600	**FLOAT** and **LEVER ASSEMBLY**	1
26	46-32-27	**SHAFT,** float lever	1
27	46-43-33	**NEEDLE,** idle adjusting	1
28	46-43-716	**HIGH SPEED NEEDLE ASSY.** (L-64-A)	1
29	46-44-39	**PACKING,** choke shaft (L-64, L-64-F)	1
29A	46-44-38	**PACKING,** choke shaft (L-64-A)	2
30	46-44-63	**PACKING,** throttle shaft	1
31	46-46-A145	**VENTURI,** 23/32" dia. throat (L-64)	1
	46-46-A144	**VENTURI,** 3/4" dia. throat (L-64-A)	1
	46-46-A133	**VENTURI,** 13/16" dia. throat (L-64-F)	1

Ref. No.	Part Number	Description	No. Req.
32	46-47-465	**NOZZLE** (L-64)	1
	46-47-257	**NOZZLE** (L-64-A)	1
	46-47-A133	**NOZZLE** (L-64-F)	1
33	46-49-101-L	**IDLE JET** (L-64, L-64-A)	1
	46-49-345	**IDLE JET** (L-64-F)	1
34	46-49-178	**POWER JET** (L-64)	1
35	46-55-230	**CUP,** throttle shaft (L-64, L-64-F)	1
36	46-55-231	**RETAINER,** throttle shaft packing 1-for throttle shaft packing. 2-for choke shaft packing (L-64-A).	—
37	46-55-243	**RETAINER,** choke shaft packing(L-64, L-64F)	1
38	46-78-62	**LOCKWASHER,** No. 8, for choke shaft	1
39	46-78-184	**WASHER,** choke swivel (L-64, L-64-F)	1
40	46-78-299	**PLAIN WASHER,** high speed needle (L-64-A)	1
	46-78-A94	**RETAINER,** "E" ring (L-64-F)	1
41	46-80-169	**PLUG,** throttle shaft (L-64-A)	1
42	46-80-171	**PLUG,** idle drilling	1
43	46-81-145	**NUT,** No. 8-32, choke lever	1
44	46-82-14	**COTTER PIN** for throttle swivel	1
45	46-82-16	**CLIP,** choke swivel (L-64, L-64F)	1
46	46-99-4	**PLUG,** 1/8" slotted pipe, for fuel inlet	1
47	46-99-7	**PLUG,** 1/8" hex. head pipe, for bowl drain	1
48	46-179-11	**PLUG,** throttle body, Expansion (L-64, L-64F)	1
49	46-227-1492	**THROTTLE BODY ASSEMBLY** (L-64)	1
	46-227-1615	**THROTTLE BODY ASSEMBLY** (L-64-A)	1
	46-227-1954	**THROTTLE BODY ASSEMBLY** (L-64-F)	1
50	46-233-536	**FLOAT VALVE** and **SEAT ASSY.** (L-64, L-64-A)	1
	46-233-609	**FLOAT VALVE** and **SEAT ASSY.** (L-64-F)	1
	46-136-110	**BRACKET,** float support (L-64-F) Not illustrated	1
51	46-62-167	**PIN,** throttle stop (L-64, L-64-A)	1
52	46-62-247	**PIN,** choke fly stop (L-64, L-64-A)	1
53	46-29-155	**CLIP,** choke casing support	1
54	46-80-167	**PLUG,** choke shaft (L-64, L-64-F)	1
	46-16-590	**GASKET SET** (L-64)	
	46-16-597	**GASKET SET** (L-64-A)	
	46-16-740	**GASKET SET** (L-64-F)	
	46-286-1228	**REPAIR KIT** (L-64)	
	46-286-1248	**REPAIR KIT** (L-64-A)	
	46-286-1580	**REPAIR KIT** (L-64-F)	

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WICO MODEL XH-1 FLANGE MOUNTED MAGNETO

Wico Spec. No. XH-2504, Wisconsin Motor Part No. Y-118 for Engine Model AENL
Wico Spec. No. XH-2523B, Wisconsin Motor Part No. Y-108B for Engine Model AGN
(Wico XH-2523, Y-108A replaced by Wico XH-2523B, Y-108B for Engine Model AGN)

INSTRUCTIONS

Y-108, 118 Series

TIMING

The magneto is properly timed to the engine at the factory. If it becomes necessary to retime the magneto to the engine, refer to the diagram and instructions in the engine instruction book.

LUBRICATION

The only lubricating point in the magneto is the cam wiper felt, *(Ref. No. 19)*. This felt, which lubricates the breaker arm at point of contact with the cam, should be replaced whenever it is necessary to replace the breaker contacts.

IMPORTANT

Incorrectly adjusted spark plug gaps cause magneto failure more frequently than any other condition.

Spark plugs should be inspected at frequent intervals, the size of the gap should be carefully checked and adjusted and the plugs thoroughly cleaned.

All oil, grease, and dirt should frequently be wiped off the magneto, lead wires, and spark plug insulators. Keeping these parts clean and the spark plugs properly adjusted will improve the engine performance and at the same time will prolong the life of the magneto.

MAGNETO COVER

The magneto cover, *(Ref. No. 50)*, can be removed by loosening the four screws *(Ref. No. 36)* which hold it in place. When replacing the cover be sure that the cover gasket *(Ref. No. 35)* is in its proper place.

BREAKER CONTACTS – REPLACEMENT AND ADJUSTMENT

The breaker contacts should be adjusted to .015" when fully opened. To adjust the contacts, loosen the two clamp screws *(Ref. No. 40)* enough so that the contact plate can be moved.

Insert the end of a small screw driver in the adjusting slot and open or close the contacts by moving the plate until the opening is .015", measuring with a feeler gauge of that thickness, tighten the two clamp screws.

To replace the contacts remove the breaker spring clamp screw *(Ref. No. 43)*, the breaker arm lock and washer *(Ref. No. 18)* and *(Ref. No. 14)*, then lift the breaker arm from its pivot. Remove the aligning washer, 5717, and the two fixed contact clamp screws *(Ref. No. 40)*. The breaker plate can then be removed.

If the contacts need replacing it is recommended that both the fixed contact and the breaker arm be replaced at the same time, using replacement breaker set X5996 *(Ref. No. 42)*.

After assembly the contacts should be adjusted as described above. The contacts should be kept clean at all times. Lacquer thinner is an ideal cleaner for this purpose. Use **WICO** tool S-5449, to adjust the alignment of the contacts so that both surfaces meet squarely.

CONDENSER

To remove the condenser *(Ref. No. 34)*, first disconnect the condenser lead by removing the breaker arm spring screw *(Ref. No. 43)*, then remove the two condenser clamp screws *(Ref. No. 22)* and the condenser clamp *(Ref. No. 30)*. When replacing the condenser make sure it is properly placed and that the clamp screws are securely tightened.

COIL AND COIL CORE

The coil and coil core must be removed from the magneto housing as a unit. Disconnect the primary wire from the breaker arm spring terminal by removing screw *(Ref. No. 43)*, take out the two coil core clamp screws *(Ref. No. 21)* and remove the clamps *(Ref. No. 38)*. The coil and core can then be pulled from the housing. When replacing this group make sure that the bare primary wire is connected under the core clamp screw and that the insulated wire is connected to the breaker arm spring terminal.

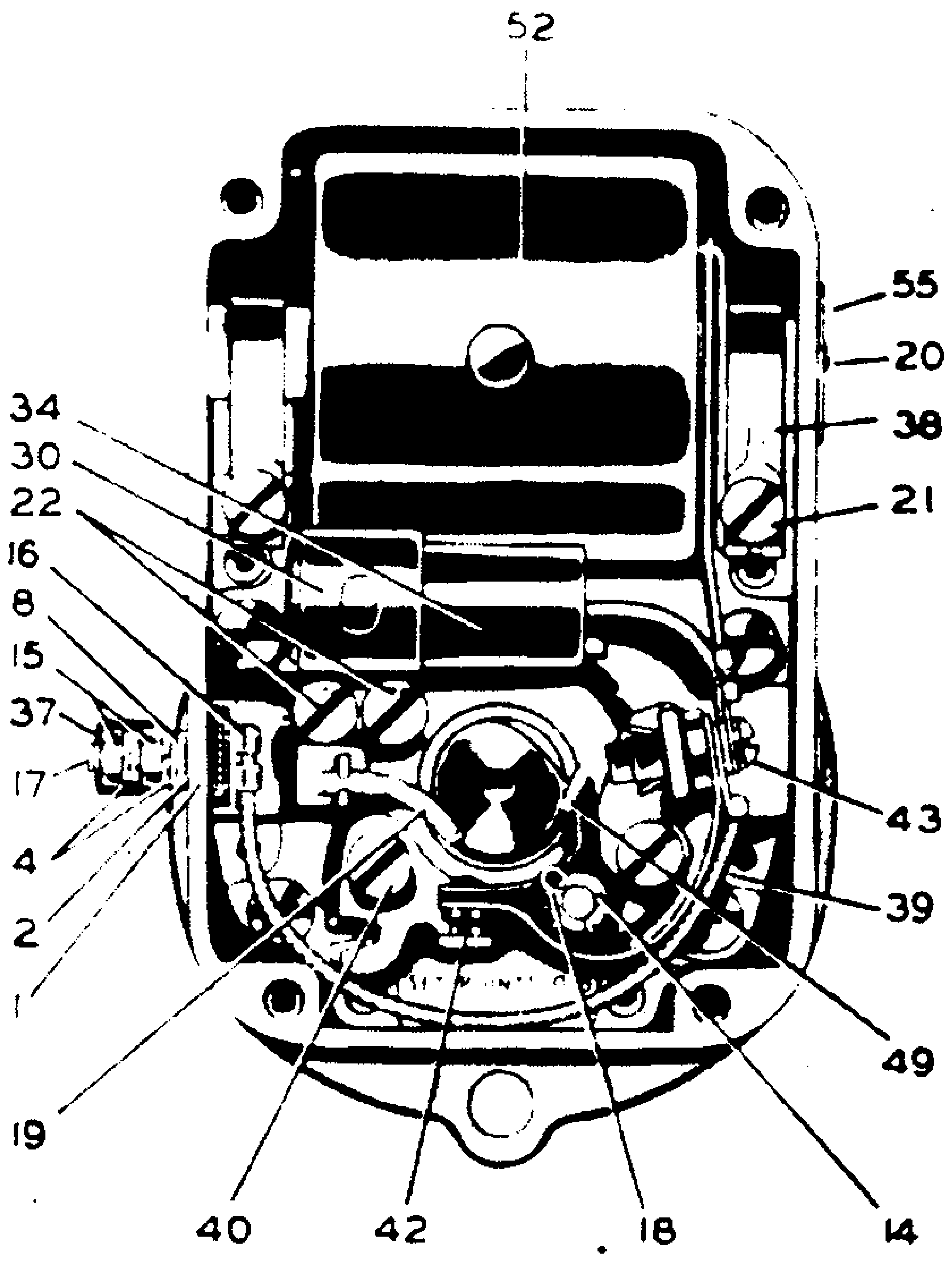
REMOVAL OF COIL FROM CORE

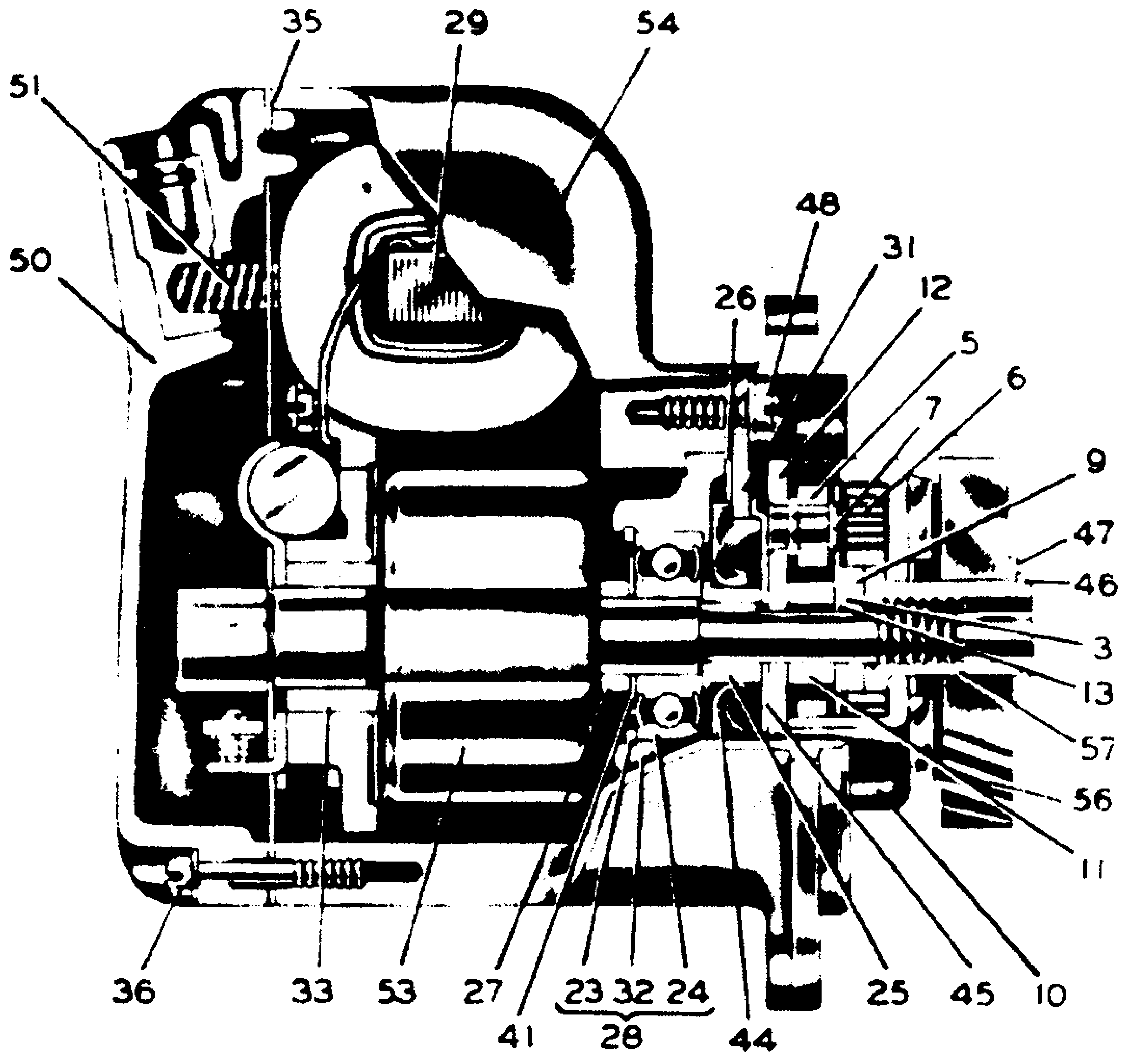
The coil *(Ref. No. 52)*, is held tight on the core *(Ref. No. 29)* by two wedges, 10383. It will be necessary to press against the coil core with considerable force to remove it from the coil. The coil should be supported in such a way that there is no danger of the primary of the coil being pushed out of the secondary.

When replacing the coil on the coil core, slide it on then press in the two coil wedges, one on each end, until they are flush with the primary of the coil.

Magneto Parts List

Y-118 For Engine Model AENL Wico Spec. No. XH-2504
Y-108-B For Engine Model AGND Wico Spec. No. XH-2523B
(Y-108-A, Wico XH-2523, replaced by Y-108-B for Engine Model AGN)





Ref. No.	Part Number	Description	No. Req.
2	YD-316	**INSULATOR** for ground stud	1
3	90-M-42XA	**SPACING WASHER** for driven flange	1
4	90-M-55XA	**LOCKWASHER** for ground stud	2
5	90-11312	**TRIP ARM** for Y-118	1
	90-A-179X	**TRIP ARM** for Y-108A, Y-108B	1
6	90-15-186	**DRIVE SPRING**	1
7	90-6585	**TRIP ARM SPRING** for Y-118	1
	90-6587	**TRIP ARM SPRING** for Y-108A, Y-108B	1
8	90-IXA-256	**WASHER** for ground stud (steel)	1
9	90-IVA-583	**SPACING WASHER** for drive cup	1
10	90-11472	**DRIVE CUP** for Y-118	1
	90-11641	**DRIVE CUP** for Y-108A, Y-108B	1
11	90-2122	**DRIVEN FLANGE SPACER**	1
12	90-X6586	**DRIVEN FLANGE GROUP** for Y-118	1
	90-X6588	**DRIVEN FLANGE GROUP** for Y-108A, Y-108B	1
13	90-2288	**RETAINER** for drive spring	1
14	90-3219	**PIVOT WASHER** for breaker arm	1
15	90-3230	**NUT** for ground stud	2
16	YD-324	**INSULATING WASHER** for ground stud	2
17	90-3945	**GROUND STUD**	1
18	90-4210	**BREAKER ARM LOCK**	1
19	90-5077	**CAM WIPER FELT**	1
20	90-5250	**SCREW** for name plate	2
21	90-5411	**CLAMP SCREW** for coil core (Sems)	2
22	90-5411	**CLAMP SCREW** for condenser (Sems)	2
23	90-5516	**RETAINING RING** for rotor bearing	1
24	90-5517	**ROTOR BEARING**	1
25	90-5518	**IMPULSE SPACER**	1
26	90-5519	**GASKET** for impulse stop	1
27	90-5520	**SPACER** for bearing cage group	1
28	90-X5521	**BEARING CAGE GROUP**	1
29	90-X5524	**COIL CORE GROUP**	1
30	90-6924	**CONDENSER CLAMP**	1
31	90-X5549	**IMPULSE STOP GROUP**	1
32	90-5567	**BEARING CAGE**	1
33	90-5610	**BUSHING** for breaker plate	1
34	90-X6916	**CONDENSER ASSEMBLY**	1
35	90-5618	**COVER GASKET**	1
36	90-5622	**SCREW** for distributor cap (Sems)	4
37	90-X5632	**STOP BUTTON GROUP**	1
38	90-5633	**COIL CORE GROUP**	2
39	90-X5757	**GROUND LEAD GROUP**	1
**	90-X5750	**GROUND CONNECTION UNIT** (Incl. Ref. Nos. 2, 4, 8, 15, 16, 17 & 39).	1
**	90-5717	**ALIGNING WASHER** for breaker point	1
40	90-5900	**CLAMP SCREW** for fixed contact	2
41	90-5926	**BALL BEARING SHIELD**	1
42	90-X5996	**BREAKER CONTACT SET**	1
43	90-5431	**CLAMP SCREW** for breaker spring	1
44	90-6199	**OIL SEAL**	1
45	90-6204	**OIL SLINGER**	1
46	90-6424	**IMPULSE LOCK RING**	1
47	90-6425	**THRUST WASHER**	1
**	90-X11473	**IMPULSE COUPLING UNIT** (Incl. Ref. Nos. 3, 5, 6, 7, 9, 10, 11, 12, 13, 46, 47 & 57) for Y-118	1
	90-X11572	**IMPULSE COUPLING UNIT** for Y-108A, Y-108B	1
48	90-6465	**CLAMP SCREW** for impulse stop (Sems)	4
49	90-6468	**BREAKER ARM FELT**	1
50	90-X6533	**COVER UNIT**	1
51	90-6732	**COIL CONTACT SPRING**	1
52	90-X5700C	**COIL GROUP** (Replaced X6762—Interchangeable)	1
**	90-10383	**COIL WEDGE**	2
53	90-Y7569	**ROTOR** for Y-118	1
	90-Y8538	**ROTOR** for Y-108A, Y-108B	1
54	90-X7265	**MAIN HOUSING GROUP** for Y-118	1
	90-X7262	**MAIN HOUSING GROUP** for Y-108A, Y-108B	1
55	90-5543	**NAME PLATE** for Y-118	1
	90-8792	**NAME PLATE** for Y-108A, Y-108B	1
**	90-10407	**BREAKER POINT ALIGNING WASHER** (thin)	1
56	GD-113	**DRIVE GEAR,** for Y-118	1
	GD-125	**DRIVE GEAR,** for Y-108A, Y-108B	1
57	90-6412	**IMPULSE LOCK NUT**	1
		** (Not Illustrated)	

Printed in U.S.A.

FLYWHEEL ALTERNATOR

with solid state regulation

12 Volt – 10 amp and 25 amp Systems For
WISCONSIN Single, Two and Four Cylinder Engine Models

DESCRIPTION of Change

Beginning with engine serial No. 5188288, a new *two module* flywheel alternator system replaces the previously furnished three module system, that included an isolation diode module, and the two unit system without the isolation diode.

The *isolation diode* module was incorporated into the old system to eliminate battery discharge problems during shut down, cranking and idling.

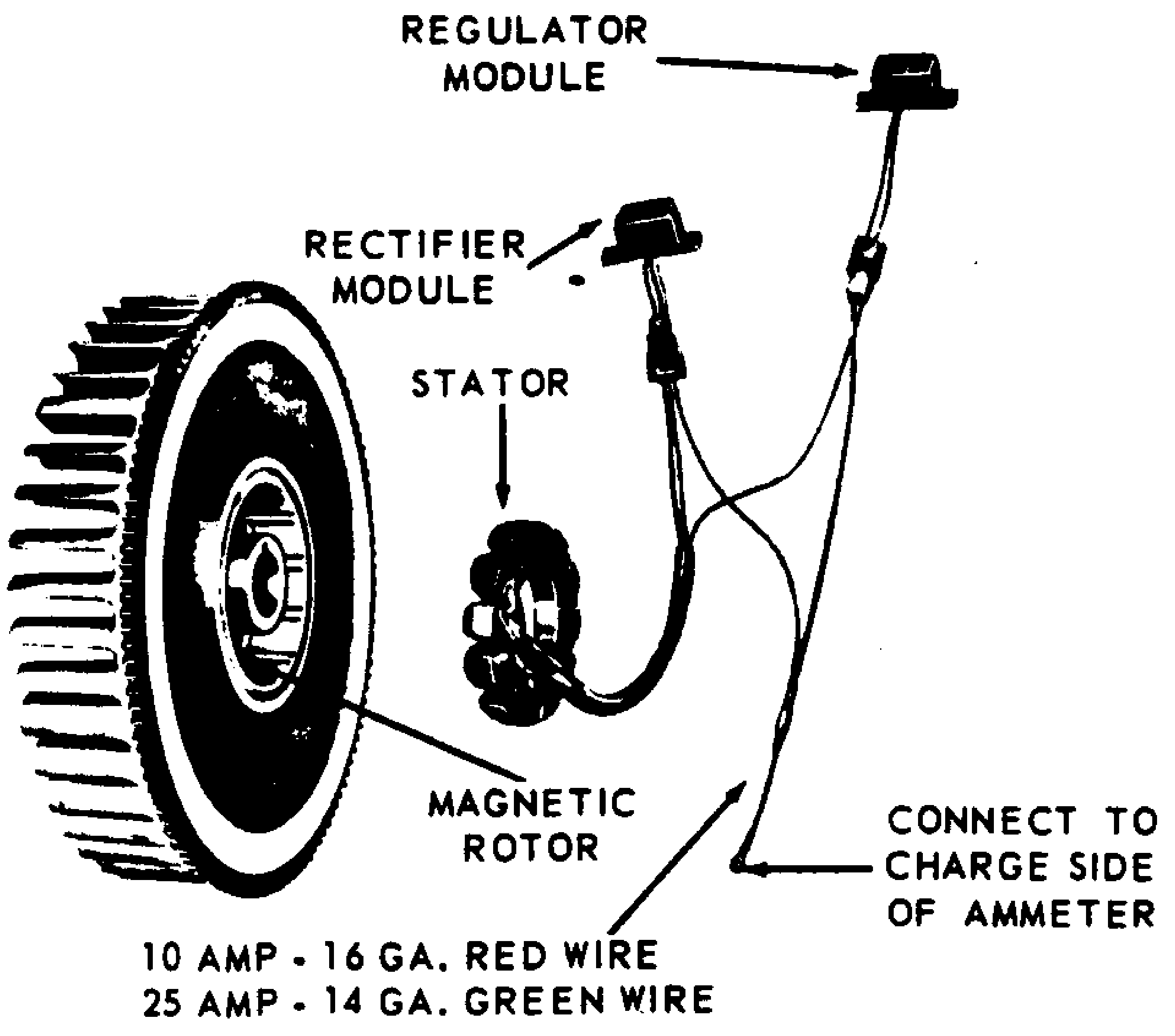
INTERCHANGEABILITY

The *Regulator module* was not changed and is completely interchangeable between the new and old systems. The *Rectifier module* and *Stator assembly* have been modified to incorporate the advantages of an isolation diode without adding a third module. These new parts are *not* interchangeable with the old unless both rectifier and stator are replaced simultaneously. The new system has a *three prong* plug connector between the rectifier and stator – the old system has a two prong connector.

DESCRIPTION and OPERATION

This flywheel alternator is of the permanent magnet type and has *no brushes, commutator, belts* or *adjustments*. A series of coils (stator) is mounted to the engine gear cover, and the magnetic flux is provided by a permanent magnet in the flywheel which rotates around these stationary coils. Only four components make up this light weight space saving system; a *flywheel* with magnetic rotor, *stator, rectifier* module and *regulator* module.

The *center-tap* rectifier arrangement prevents damage to the alternator system when arc welding, because the winding acts as a choke and its inductance prevents the transient voltage from damaging the diodes.



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Since the physical appearance of both 10 amp and 25 amp alternator systems are very similar, the *25 amp unit* can be distinguished from the *10 amp unit* by the ammeter calibrations, and by a *14 gage green wire* in place of a *16 gage red wire,* from the ammeter to the stator-regulator connector.

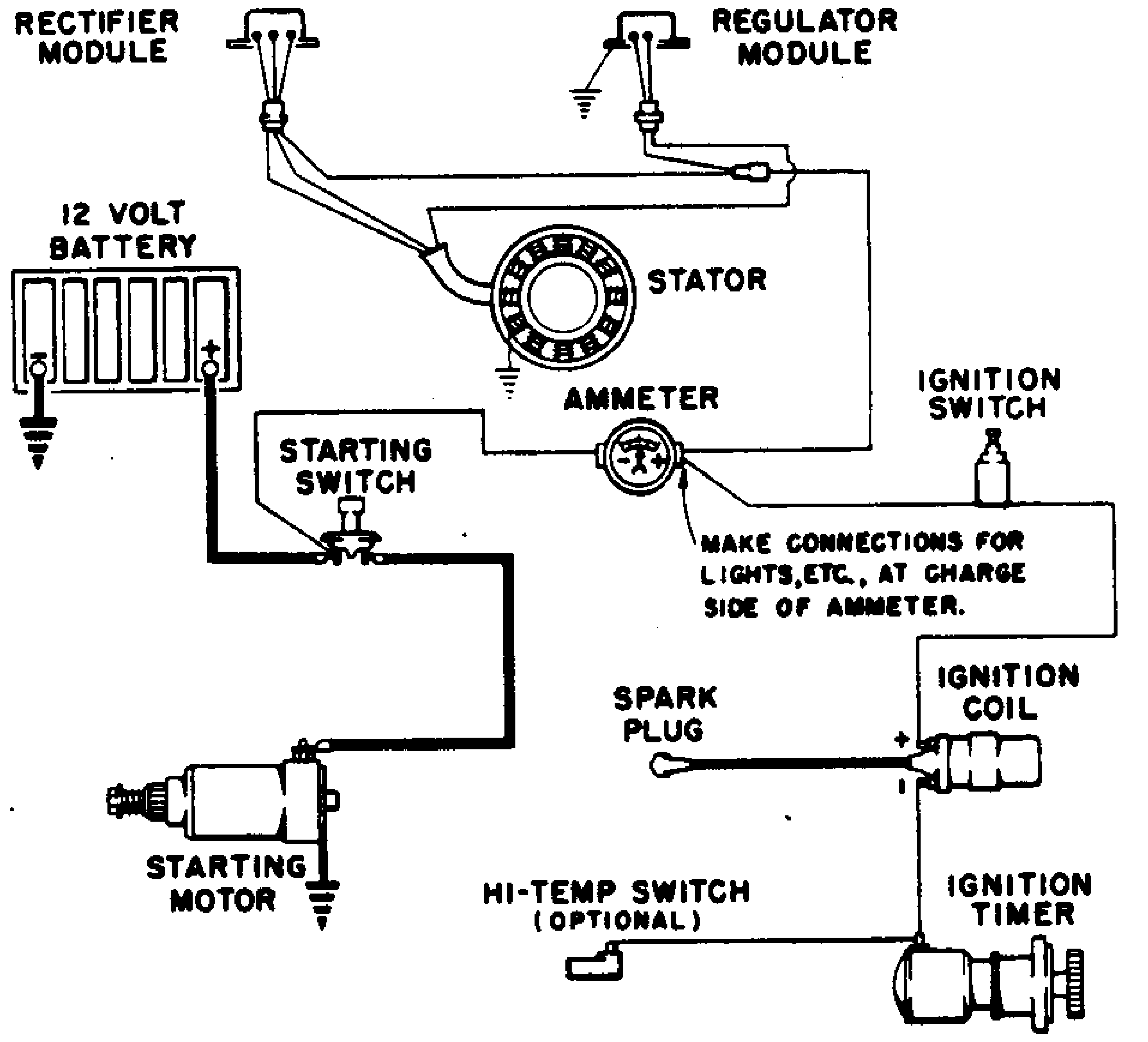
PRECAUTIONS to be exercised in the use of this flywheel alternator:

1. *Do Not* reverse battery connections. This is for a *negative ground* system only.
2. Connect booster batteries properly – positive to positive and negative to negative.
3. *Do Not* polarize the alternator.
4. *Do Not* ground any wires from stator or modules which terminate at connectors.
5. *Do Not* operate engine with battery disconnected from system.
6. Disconnect at least one battery lead if a battery charger is used.

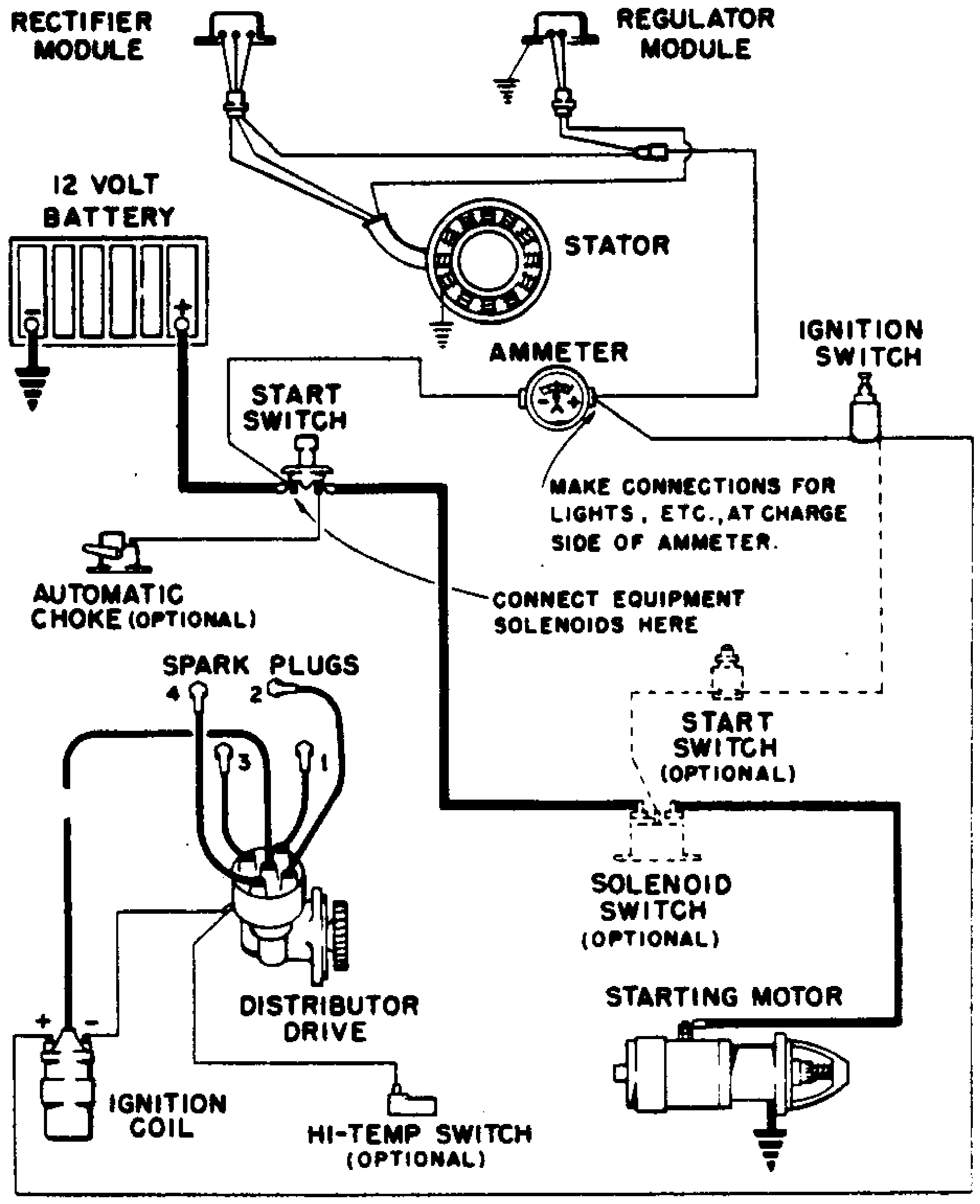
WIRING CIRCUIT

The *fool-proof* type connectors used prevent incorrect wiring from the stator to the rectifier and regulator modules. To disconnect plugs, squeeze outer ends of receptical and pull apart.

The rectifier is insulated from ground, but the stator and regulator module are grounded to the engine thru their mounting surface. The regulator module therefore should not be removed and mounted at some remote location. This is a ***negative ground circuit.*** Connect ground strap from negative post of battery to starting motor flange, or good clean grounding surface on engine.



WIRING DIAGRAM
For Single Cylinder Models


RECTIFIER MODULE
REGULATOR MODULE
12 VOLT BATTERY
STATOR
AMMETER
IGNITION SWITCH
START SWITCH
MAKE CONNECTIONS FOR LIGHTS, ETC.,AT CHARGE SIDE OF AMMETER.
AUTOMATIC CHOKE (OPTIONAL)
CONNECT EQUIPMENT SOLENOIDS HERE
SPARK PLUGS
4
2
3
1
START SWITCH (OPTIONAL)
SOLENOID SWITCH (OPTIONAL)
DISTRIBUTOR DRIVE
STARTING MOTOR
IGNITION COIL
HI-TEMP SWITCH (OPTIONAL)

WIRING DIAGRAM
For Two and Four Cylinder Models

SERVICE PROCEDURE:

Prior to electrical testing, a thorough visual inspection should be made to eliminate conditions that may be interpreted as a defected alternator. Examine leads for broken or loose connections, and make sure modules are securely mounted. The ***regulator module*** must be mounted to a metal surface for grounding purposes, while the ***rectifier module,*** although insulated from ground, should be securely mounted for heat dissipation. The mounting surfaces must be clean and free of contaminants, oil, grease, etc. When assured that the problem is with the alternator, follow the tests outlined in *'Trouble Shooting'*.

TROUBLE SHOOTING

10 and 25 amp Flywheel Alternator

Problem: Battery Overcharge	Possible Cause & Remedy
Test 1.0 With engine running at full RPM, check battery voltage w/ DC Voltmeter.	
1.1 If voltage is over 15.0	1.1 Regulator not functioning properly. Replace module.
1.2 If voltage is under 15	1.2 Alternator functioning properly. Check battery condition.

Problem: Low/No Charge	Possible Cause & Remedy
Test 1.0 With engine running at full RPM, check battery voltage w/ DC meter. If voltage is greater than 14 volts, place * load on battery to reduce voltage below 14 volts.	
1.1 If the charge rate increases –	1.1 Alternator functioning properly. Battery was fully charged.
1.2 If the charge rate does not increase–	1.2 Proceed with Test 2.0.

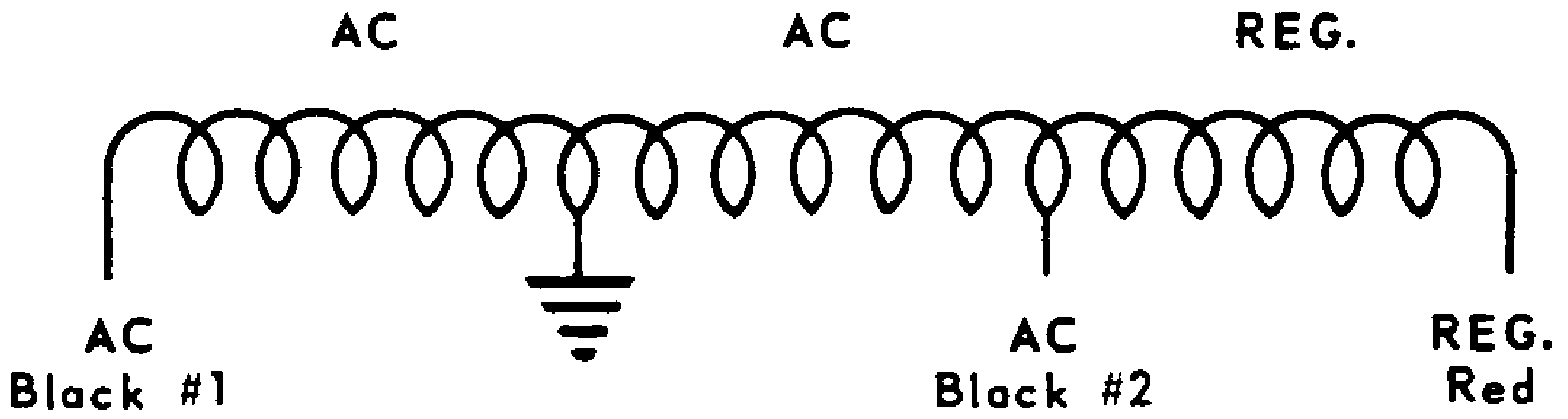
* Place as many 12 volt light bulbs across battery as required to reduce voltage below 14 volts. A carbonpile resistor may be used in place of bulbs.

Problem: Low/No Charge	Possible Cause & Remedy
Test 2.0 Conditions and procedure the same as Test 1.0 except the regulator module is disconnected.	
2.1 If the charge rate increases –	2.1 Regulator was at fault. Replace regulator module.
2.2 If the charge rate does not increase–	2.2 Regulator is not at fault. Continue with Test 3.0.
Test 3.0 Test conditions and procedure the same as 1.0 except with new rectifier module plugged in.	
3.1 If the charge rate increases –	3.1 Rectifier module at fault. Permanently install new rectifier module.
3.2 If the charge rate does not increase–	3.2 Continue with Test 4.0.
Test 4.0 With engine stopped, unplug all connectors between modules and stator. Start engine and run at 2400 RPM. With AC voltmeter check voltage between each of the black stator leads and ground.	
4.1 If one of the two voltages is zero or they are over 10% apart –	4.1 The stator is faulty and should be replaced.

Further testing can be done on the component level with the engine stopped, and the stator and module connections including output lead uncoupled.

TO CHECK STATOR

Use an ohmmeter and check continuity as follows:



NOTE: Wire numbers indicated for probe connections are for convenience only and are not indicated on the connectors.

For 10 amp unit STATOR

METER PROBE CONNECTIONS + –		METER VALUE	REPLACE STATOR
Black #1 to Black #2	APPROX.	2.0 ohms	0 Indicates Short Circuit. ∞ Indicates Open Circuit.
Black #1 to Eng. Gnd.		1.0 ohm	
Black #2 to Eng. Gnd.		1.0 ohm	
Black #1 to Red		3.0 ohms	
Black #2 to Red		1.0 ohm	

For 25 amp unit STATOR

METER PROBE CONNECTIONS + –		METER VALUE	REPLACE STATOR
Black #1 to Black #2	APPROX.	0.40 ohm	∞ Indicates Open Circuit.
Black #1 to Eng. Gnd.		0.20 ohm	
Black #2 to Eng. Gnd.		0.20 ohm	
Black #1 to Red		3.20 ohms	
Black #2 to Red		2.80 ohms	

STATOR IDENTIFICATION:
10 amp – 3/8" wide flange   25 amp – 5/8" wide flange

TO CHECK RECTIFIER MODULE, Part No. YJ-68

The same module is used for both the *10 amp* and *25 amp* systems. It can be distinguished from the *regulator* by the three lead wires instead of two and the identification decal. Use an ohmmeter and ***static check*** continuity as follows:

METER PROBE CONNECTIONS + –	METER INDICATION
White lead to Black #1	No Continuity
Black #1 to White lead	Continuity
White lead to Black #2	No Continuity
Black #2 to White lead	Continuity

Note: Continuity shall be in one direction only. If readings are not as indicated, replace module.

TO CHECK REGULATOR MODULE, Part No. YJ-60

The same Regulator module is used for both the *10 amp* and *25 amp* systems. Use an Ohmmeter and ***static check*** as follows:

METER PROBE CONNECTIONS + –	METER INDICATION	REPLACE MODULE
Red to Eng. Gnd.	No Continuity	Continuity
Eng. Gnd. to Red	↓	↓
Red to Black	↓	↓
Black to Red	↓	↓
Black to Eng. Gnd.	↓	↓
Eng. Gnd. to Black	Continuity	No Continuity

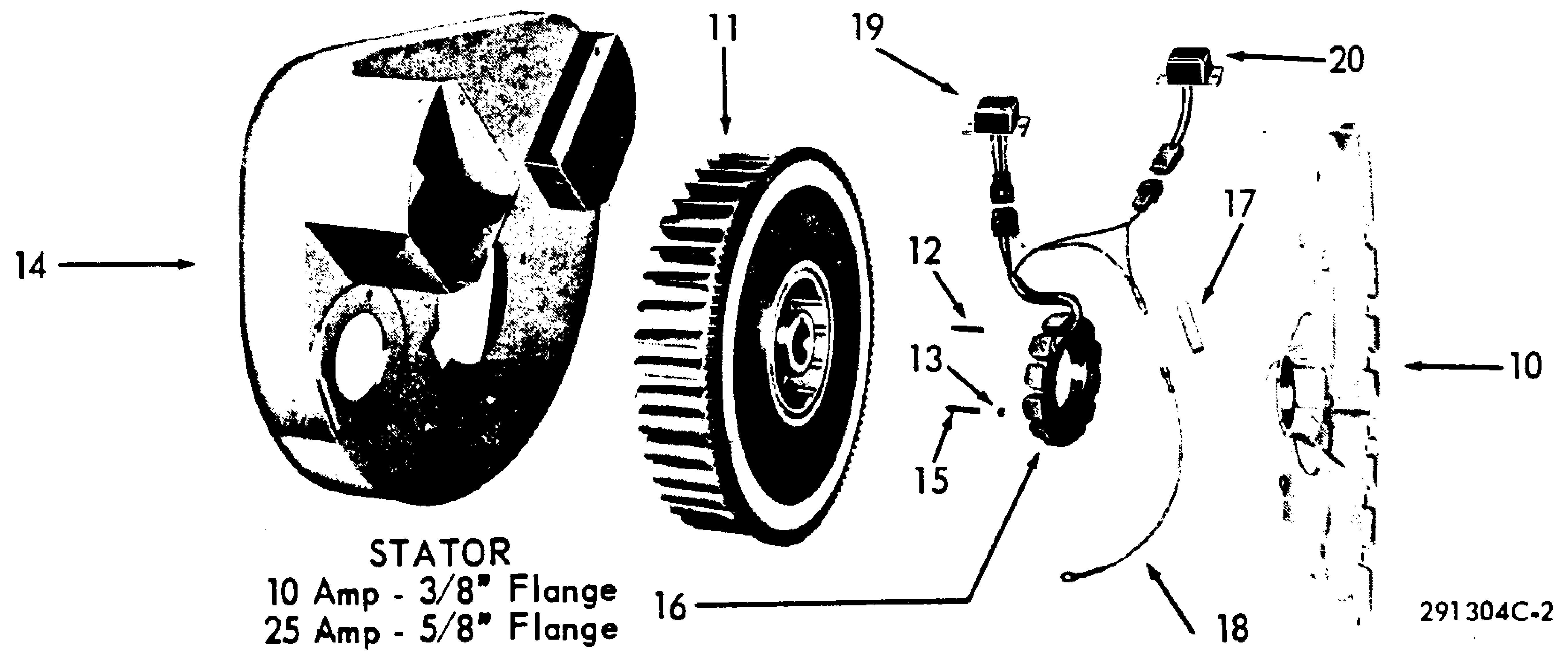
AMP OUTPUT regulated by engine speed

MODEL	MAXIMUM ENGINE SPEED	10 AMP SYSTEM	25 AMP SYSTEM
S-12D, S-14D AENL, TJD	3600 RPM	10 amps	25 amps
AGND	3200 RPM	10 amps	23 amps
VH4D	2800 RPM	9 amps	20 amps
VG4D	2400 RPM	8 amps	17 amps

FLYWHEEL ALTERNATOR 12 VOLT – 10 AMP and 25 AMP Systems

For Engines beginning with Serial Number 5188288

SERVICE PARTS LIST: The following items are in addition to, or replace similar parts found in the parts manual of each specific engine model. The parts illustration is for the **VG4D** engine, but can be applied to all models.



REF. NO.	DESCRIPTION	NO. REQ.	PART NUMBER PER ENGINE MODEL					
			AENL	AGND	S-10D, S-12D, S-14D	THD, TJD	VF4D, VH4D	VG4D
10	**GEAR COVER ASSEMBLY** **BEARING RETAINER PLATE** – flywheel end	1 1	BG-344-S1	BG-343-S1	BG-350A-S1	BD-103J-S1	BD-100K-4-S1	BD-101B-S1
* 11	**FLYWHEEL** with rotor and ring gear For 10 amp alternator circuit For 25 amp alternator circuit	1 1	N-104-5 N-104-9	N-103-5 N-103-9	N-105-2 N-105A-3	N-102-5 N-102-9	N-101-6 N-101-10	N-100-5 N-100-9
12	**ROLL PIN** – For 10 amp stator For 25 amp stator	2 2	PA-336 PA-362	PA-340 PA-340		PA-368 PA-340	PA-368 PA-340	PA-368 PA-340
13	**LOCKWASHER**, No. 10, for stator mt'g.	4	PE-14	PE-14	PE-14	PE-14	PE-14	PE-14
* 14	**FLYWHEEL SHROUD**	1	SE-154-A	SE-217-H	SE-289-A w/ SE-301B-1 Pl.	SE-135-AT	SE-74-YA	SE-124-AM
15	**SCREW** – For 10 amp stator mt'g. For 25 amp stator mt'g.	4 4	XB-114 XB-110	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106	XB-113 XB-106
16	**STATOR ASSEMBLY** – For 10 amp circuit For 25 amp circuit	1 1	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82	YB-81 YB-82
17	**INSULATOR** – ammeter wire connector	1	YD-350	YD-350	YD-350	YD-350	YD-350	YD-350
18	**WIRE ASSEMBLY** – stator plug to ammeter For 10 amp stator For 25 amp stator	1 1	YL-381-6 YL-380-6	YL-381-6 YL-380-6	YL-381-18 YL-380-18	YL-381-14 YL-380-14	YL-381-18 YL-380-18	YL-381-22 YL-380-22
19	**RECTIFIER MODULE** – For 10 and 25 amp	1	YJ-68	YJ-68	YJ-68	YJ-68	YJ-68	YJ-68
20	**REGULATOR MODULE** – For 10 amp and 25 amp circuit	1	YJ-60	YJ-60	YJ-60	YJ-60	YJ-60	YJ-60

PARTS REQUIRED – NOT ILLUSTRATED

* **CRANKCASE**	1	AA-91B-10	BA-54-20				
ENGINE BASE	1	BB-128A-5					
CLIP for stator wires	1	PG-630-1	PG-430				
GROMMET for stator wires	1			PH-198B-1			
GASKET for bearing retainer plate	1	QD-833					
NUT, #10-32, for mounting modules	4	PD-115	PD-115	PD-115	PD-115	PD-115	PD-115
LOCKWASHER, #10 I.E.T., for mounting modules	4	PE-78-A	PE-78-A	PE-78-A	PE-78-A	PE-78-A	PE-78-A
SCREW, #10-32, for mounting modules	4	XA-7	XA-7	XA-7	XA-8	XA-8	XA-8

* **NOTE:** Because of the available variations in Flywheels, Flywheel Shrouds and Crankcases – give Engine Model, Specification and Serial Numbers when ordering.

Limited Engine Warranty

Teledyne Total Power warrants each new Wisconsin 4-cycle air-cooled engine sold by Teledyne Total Power to be free from defects in material and workmanship, under normal use and service, for a period of one (1) year (except in the case of an engine used on any recreational type vehicle the period shall be ninety (90) days after the date of delivery to the original retail purchaser), and Teledyne Total Power will, at its option, replace or repair at a point designated by Teledyne Total Power any part of parts which shall appear to the satisfaction of Teledyne Total Power upon inspection at such point, to have been defective in material or workmanship. This warranty does not obligate Teledyne Total Power to bear any transportation charges in connection with the replacement or repair of defective parts.

This Warranty shall not apply to any engine which shall have been installed or used in a manner not recommended by Teledyne Total Power, nor to any engine which shall have been repaired, altered, used in any type of competition, nor operated other than within Teledyne Total Power specified limits, neglected or used in any way which, in Teledyne Total Power's opinion, adversely affects its performance; nor to any engine in which parts not supplied or approved by Teledyne Total power have been used; nor to any accessories installed on the engine where the accessory manufacturer has its own warranty; nor to normal maintenance services or replacement of normal service items.

Teledyne Total Power reserves the right to modify, alter, and improve any engine or parts without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or parts.

THIS WARRANTY, AND TELEDYNE TOTAL POWER'S OBLIGATION HEREUNDER, IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITIES, INCLUDING SPECIAL OR CONSEQUENTIAL DAMAGES OR CONTINGENT LIABILITIES ARISING OUT OF THE FAILURE OF ANY ENGINE OR PART TO OPERATE PROPERLY. No person is authorized to give any other warranty or to assume any additional obligation on Teledyne Total Power's behalf unless made in writing and signed by an officer of Teledyne Total Power.

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